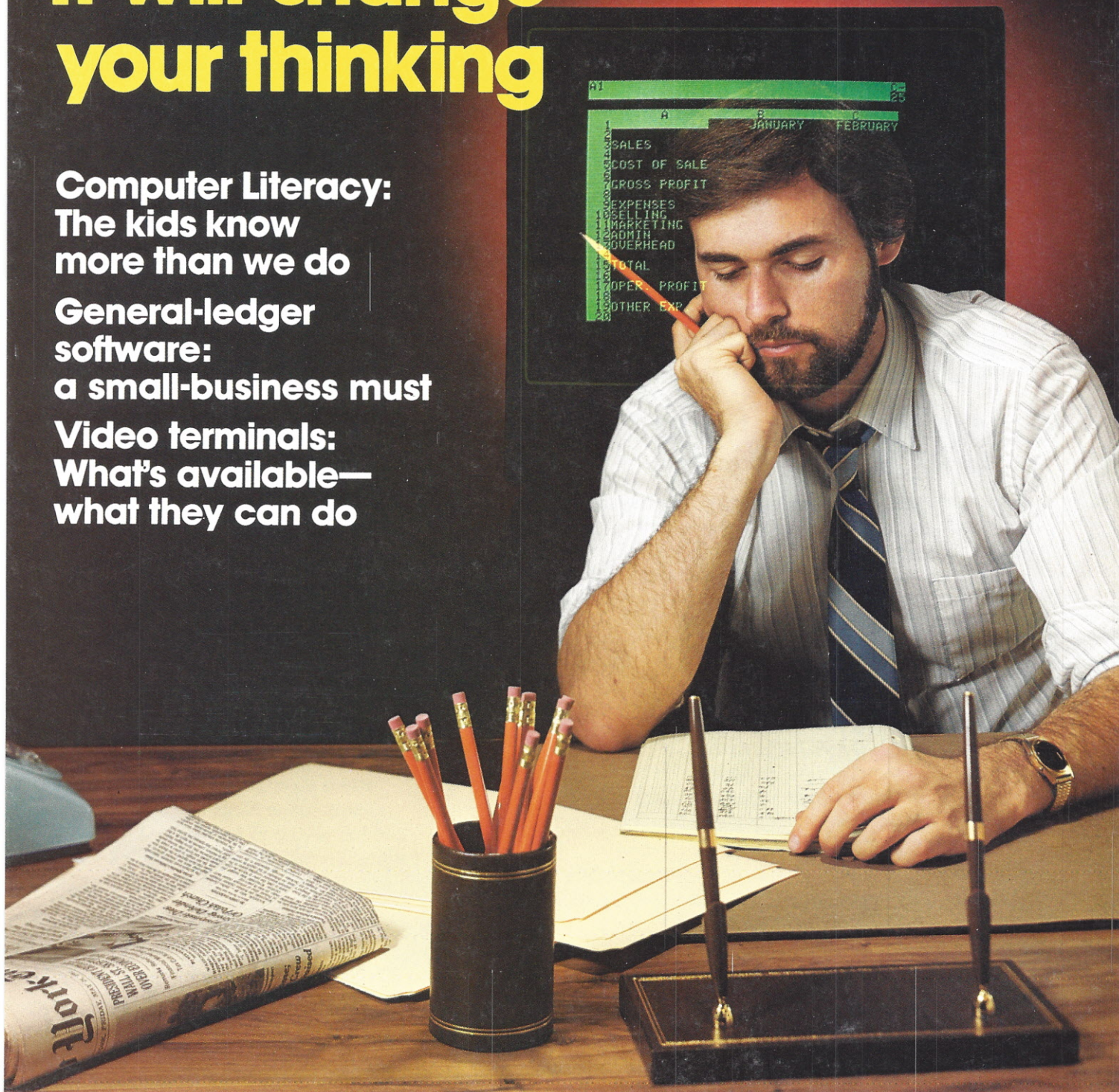


# PERSONAL COMPUTING

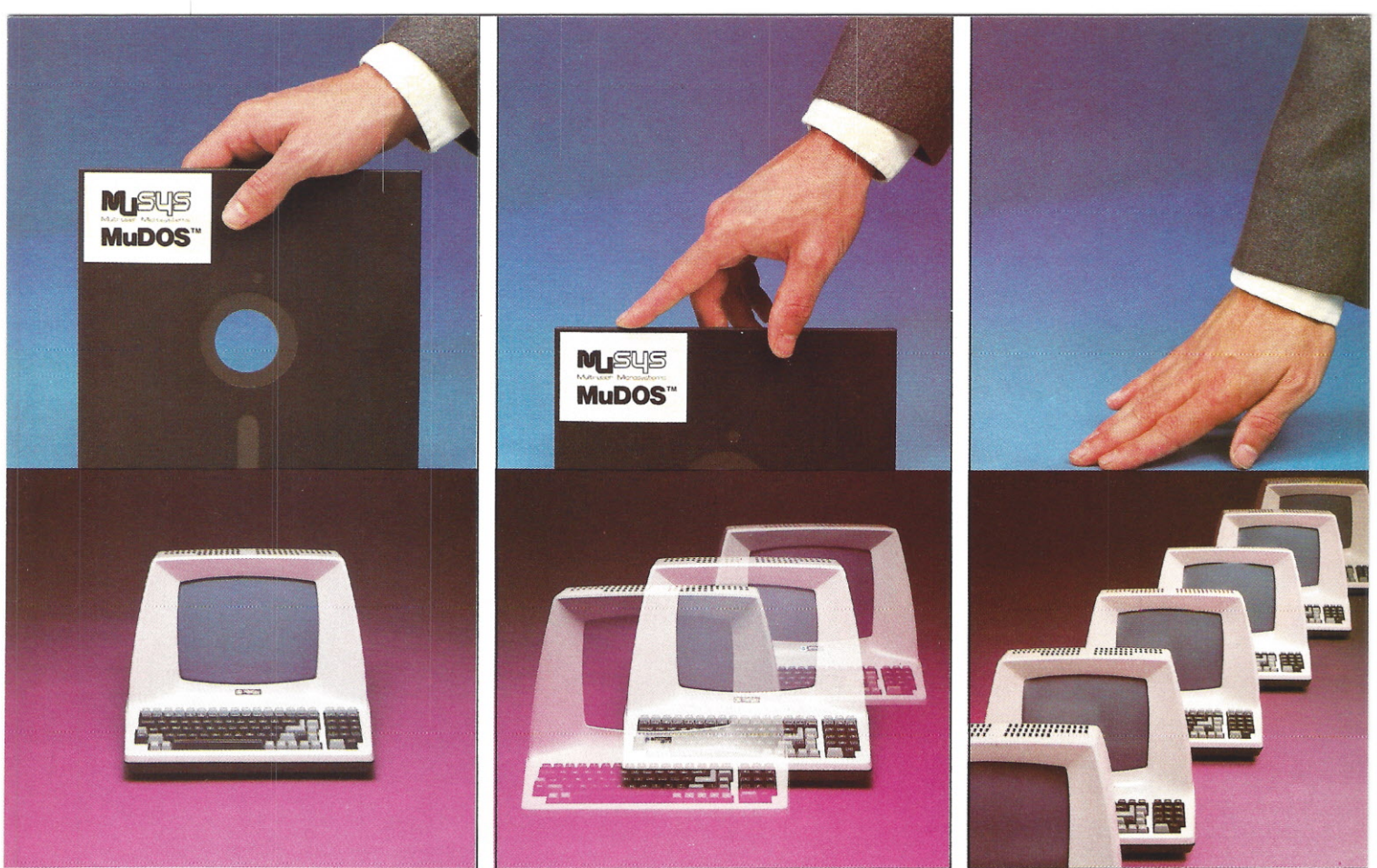
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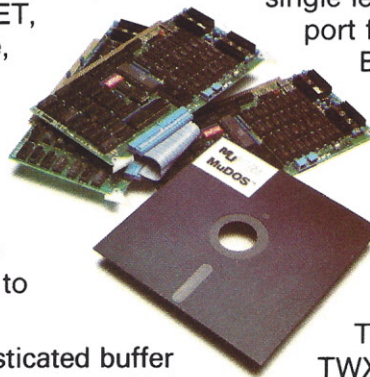
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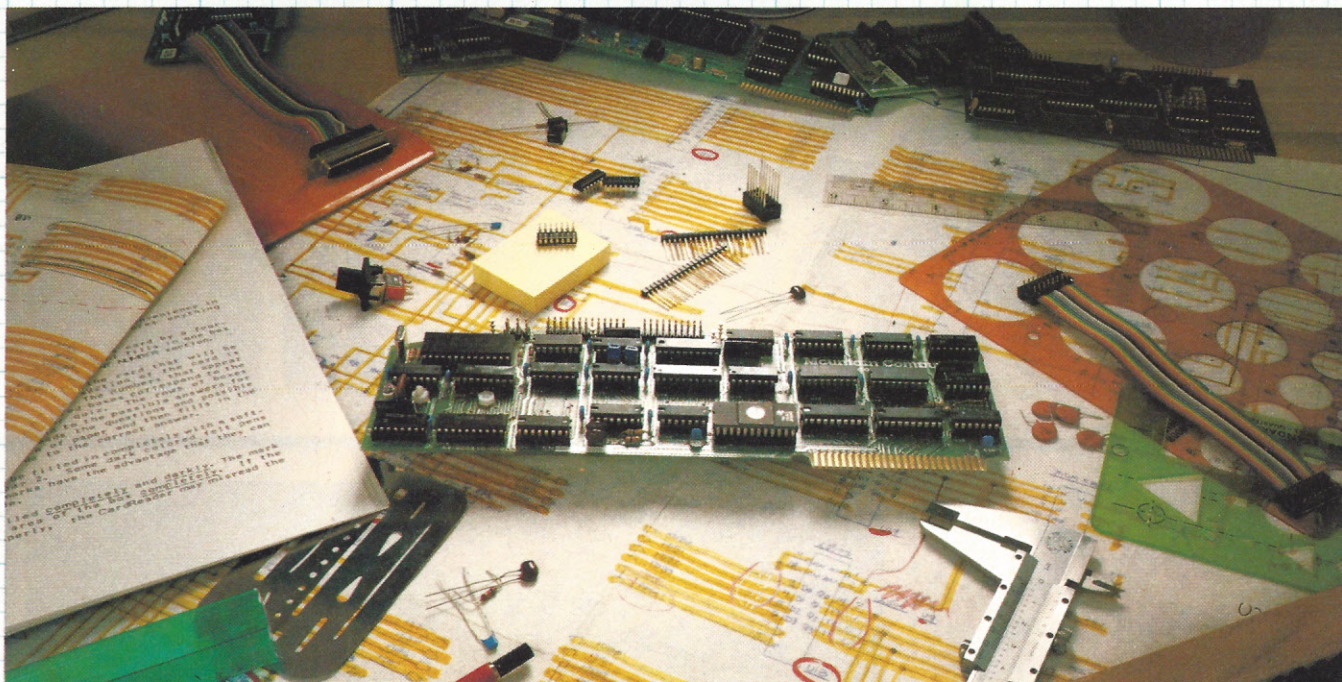
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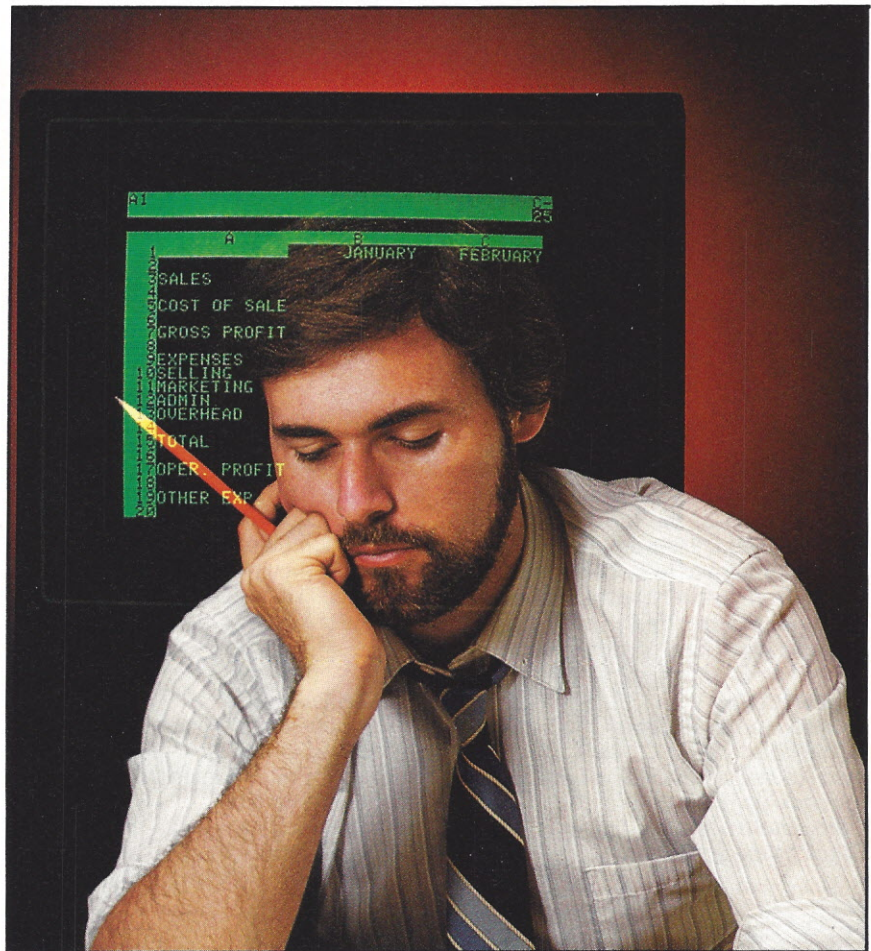
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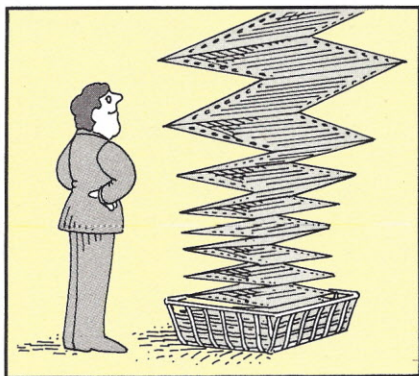


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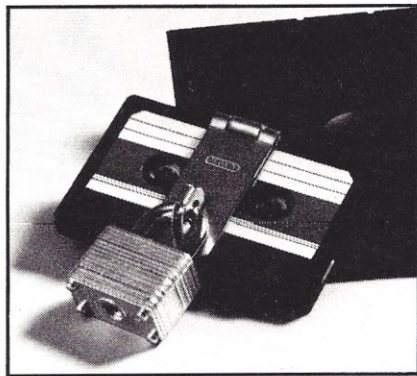
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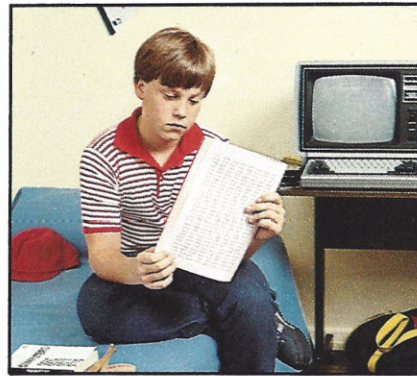




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### 39 THE ABCs OF VDTs

BY STANLEY VEIT Not all personal computers have the VDT built into the cabinet. As users move to more sophisticated computers, they may suddenly find that they need a VDT. Our round-up points out the features to look for, and details the uses for the VDT.

### 51 SOFTWARE-PROTECTION SCHEMES: HOW THEY WORK

BY MEL PATRICK Don't get frustrated over your inability to copy that latest piece of software you just got. Authors protect their software for good reasons. Here you'll find out how some of the methods work.

### 56 COMING TO TERMS WITH COMPUTER LITERACY

BY CAROL KLITZNER Literate people ain't only those who can read. The focus has moved to computers, and to educating the young 'uns so that they will be computer literate by the time they finish their schooling. Educators are spearheading the battle, for they know that Alfred North Whitehead was correct: "Education which is not modern shares the fate of all organic things which are kept too long."

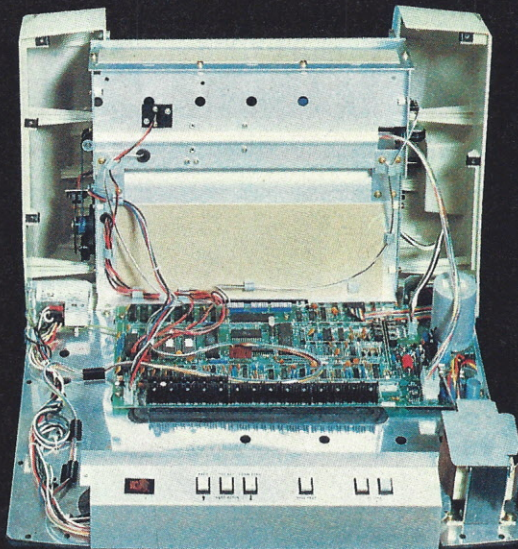
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**BEHIND THE COVER** Probably not since the last industrial revolution has the American worker faced such changes as those that are imminent today. And those changes are not limited to procedures: The way we think is changing because of the personal computer.

---



# Say Ahh...



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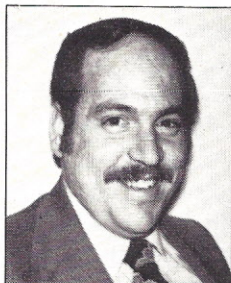
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# Whatever happened to...



**Personal Computing** has been undergoing drastic changes in the last few months, and responses on Reader Service cards show that an overwhelming majority of readers like it. We look more modern. We've widened our coverage. We try to talk your language.

This issue completes an initial period of radical reorganization. We will continue to change, as the need arises, to improve service to you, but for the most part, the corrections may not be as noticeable. We welcome suggestions from you on how to improve service.

Some readers have already gone on record with requests for more on chess and more program listings. Let's examine these two areas.

### Computer chess

Quite a few readers have expressed concern because the chess section has not appeared in the last few issues. Our reply: Hang in there. We haven't ditched the coverage. We are reviewing and revising the section to broaden interest in it.

In forthcoming issues we'll evaluate the Morphy chess computer and look at some of the latest products in computer chess. There will be announcements of upcoming computer chess events. And more.

### Programs and listings

Another comment that has turned up on some Reader Service cards is that we're not carrying as many program listings as we formerly did. That's right—and for good reason.

We now insist that all programs submitted for publication be accompanied by a copy on computer-readable media. In the past, programs that didn't run have sometimes slipped into print. We check them now. We run all programs to be sure they work and then generate program listings for you from these programs.

Another reason why we're publishing fewer programs is that we're getting away from some of the trivial ones and striving for more interesting and useful ones. We are primarily interested in programs that help the user solve a problem in a profession, a business or the home. If you have such a program, let us know.

Let's hear from you, too, if you have developed a particularly useful utility program that you'd like to share with others. Wherever possible, give suggestions on how your programs can be modified to work on other brands of computers.

For those of you who will be writing an article for the first time, drop me a line and I'll send you our new writer's guide.

A handwritten signature in cursive script that reads "Jules H. Gilder".



# PERSONAL COMPUTING

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## FEEDBACK

### Left Out

Dear Editor:

While I found "A User's Guide To Operating Systems" in the May 1981 issue to be an excellent survey of available systems, I was disappointed to find our CODOS (Channel-Oriented-Disk-Operating-System) conspicuous by its absence. Of the systems available for 6502-based computers, CODOS comes the closest to being a "universal" 6502 system (in the sense that CP/M is a "universal" 8080/Z80 system), being available in compatible forms for the KIM-1, SYM-1, AIM-65, and PET computers. Support for yet another computer will be announced soon.

The CODOS software occupies only 8k bytes of the 16k bytes of on-board RAM on our disk controller board. The controller features DMA operation using the NEC UPD-765 single chip controller with a separate data separator. It can support up to 4 single- or double-sided, double-density 8-inch drives for a maximum of 4 megabytes of formatted storage.

Bruce D. Carbrey  
Software Manager  
Micro Technology Unlimited  
Raleigh, NC

plexed that our products were not mentioned in the article.

The 6106/08 is our line of 5¼-inch Floppy Disk Drives, unique in that they are the smallest such drives available. Three BASF 6100 Series drives can be mounted in the same space required by only two conventional sized drives, allowing capacity upgrades without redesign of an existing system.

The BASF 6170 Series is a high-performance line of 8-inch Fixed Disk Drives, available in 8, 24, and 40-Mbyte versions. The drives are available with a choice of interfaces: Disk Bus, SMD, or the ANSI-compatible Standard Device Interface (SDI).

BASF recently unveiled a line of 5¼-inch Fixed Disk Drives, the 6180 Series. These drives offer capacities of 6 or 10 Mbytes, and are perfect upgrades for floppy-based systems.

Kathy Stanford  
BASF  
Bedford, MA

*Editor's reply: We apologize to both Micro Technology Unlimited and BASF for these omissions.*

### Just The Ticket

Dear Editor:

Your plotting program, Flex-Plot, published in the April, 1981 issue of Personal Computing, appears to be just what I need to add printer-graphics to a library of basic statistical routines for my microcomputer. The article mentions that Flex-Plot was initially written in FORTRAN. I am interested in acquiring a FORTRAN version of Flex-Plot, if possible.



I have a Cromemco Model Z-2D with 64k RAM, and an IDS Model 440 dot-matrix printer, which I purchased to learn FORTRAN to enhance my capabilities in the field of geology. Your Flex-Plot routine would compliment some of the FORTRAN routines which I have been adapting to a microcomputer.

If it would be possible to acquire Flex-Plot or other graphics routines in FORTRAN, I would appreciate hearing from you.

Vance Hall  
Houston, TX

*Editor's reply: The FORTRAN information you seek is being sent to you by Jerry Froelich, the author of the article to which you refer.*

## Thank You

Dear Editor:

Just a brief note to tell you how much I enjoyed Robert Perry's article on financial-planning software. This (financial planning) is one of my special interests, and I've had VisiCalc with my Apple /// for six months now with very excellent results, especially on projecting inflation's effects. However, VisiCalc has one limitation. That's the lack of the "IF-THEN-ELSE" capability.

The article was very helpful. My congratulations, please, to Mr. Perry.

Eugene J. Minahan  
Cocoa Beach, FL

*Editor's reply: We appreciate your appreciation. We also like Mr. Perry's work; hence, his article on general-ledger software appears in this issue.*

## Not A Toy

Dear Editor:

Thanks for the article "Today's Personal Computers: Products Designed for every Need—Part II" in your June issue.

It is a pleasure to discover that my NorthStar Horizon computer is still considered worthy of mention. I was beginning to fear that it was being completely ignored by every current market reviewer.

I agree with Ken Mazur's statement: "The Horizon is a versatile system...(and)...has a lot to offer." I have been required to attain a degree of computer sophistication I hadn't really planned for when I ignored NorthStar's recommended peripherals (terminal and printer), but all's well that ends well.

If I knew then what I know now, I would *still* purchase a NorthStar Horizon as the most cost-effective solution for my needs, which include flexibility and expansion capability. It is *not* a toy, but it *is* a learning tool in addition to being an excellent small-business computer.

John R. Dye, CDP  
Lacey, WA

## Not True

Dear Editor:

Thank you for "User's Guide to Operating Systems," by Boyd, Good and Veit.

CP/M indeed has a number of "idiosyncrasies," but the statement on page 83 (Personal Computing, May 1981) following the heading "A word of caution," is false in all three of its parts. To swap disks under CP/M, you must first close all out-

put files, then swap disks, and then issue the BDOS function called Initialize. All of this can be done, for example, by a CBASIC program. Reboot is not required. Should the swap provoke a disk error due to omission of Initialize, the error will be a write error, not a read error. Under CP/M you can always read a disk, Initialized or not. That is one of CP/M's idiosyncrasies. Finally, there is no way you can provoke CP/M into overwriting the disk directory. Incorrect swapping procedure clobbers files, not their directory entries.

Jack D. Dennon  
Warrenton, OR

## Complaints

Dear Editor:

I propose that you start a reader's column in which the reader can comment on the people who advertise in your magazine.

I ordered a printer on April 20, received a bill from Master Card May 21, but still haven't received the printer.

Ordering by mail has a high risk for your readers, especially when items are greater than \$100.

Do you investigate your advertisers? I hope so.

Dick Hanes  
Berthoud, CO

*Editors reply: We regret that readers may have difficulty with advertisers. We recommend that the reader attempt to settle the problem with the advertiser himself. If all else fails, Personal Computing may be able to intercede on a reader's behalf.*



# OUTLOOK

## TRS-80 Provides Electronic Newspaper

Still another thing that can be done with a personal computer was announced recently by Radio Shack. The *Advertiser-Tribune* in Tiffin, OH, is using Model II versions of the TRS-80 to provide an electronic newspaper.

Subscribers can see the newspaper's electronic edition via Videotex, an electronic communication method that transfers information over telephone lines for display on a standard TV set.

To get the electronic newspaper, customers will need either a Videotex terminal or a personal computer equipped with the hardware and software to operate as a Videotex terminal.

Radio Shack offers the appropriate terminals at its stores, computer centers and participating dealerships.

## The British Are Coming

Hard on the heels of the Radio Shack announcement comes the word that the British are in the U.S. market with what is called "the world's most advanced teletext technology." The entry was signaled by a recent demonstration of the technology at a meeting of the Institute of Electrical and Electronic Engineers in Chicago.

"We have all the technology that will be needed in teletext and videotex systems in the foreseeable future," said Trevor Armstrong, head of BVT, which markets British videotex and teletext technology. But, he noted, "most importantly, we have the advantage of being able to deliver working systems now—and to support them—because of our years of operational experience."

## Apple Into The Act, Too

And Apple Computer is also getting into the teletext act, with the announcement that Apple Canada and Norpak, a Canadian firm, have reached an agreement under which Norpak will be designing a Telidon interface card for Apple II and /// computers. Telidon is the version of videotext used in Canada.

## The Winner

Reversi Sensory Challenger from Fidelity Electronics has won the *Second International Tournament of Othello Programs*, held recently in Lyon, France. The program won all its matches. The tournament was sponsored by L'Ordinateur Individuel, Palais des Congres de Lyon. Fidelity says this is the first recognized tournament in which the RSC program has competed.

## In The News

A microcomputer newsletter for librarians is being published monthly by the Graduate Library School at the University of Arizona. Called *Small Computers in Libraries*, the newsletter will act as a clearinghouse for information on micros in libraries and will offer guidance to those who are new to the field in the form of glossaries, short tutorial articles and reviews of both programs and books. Subscription orders should be sent to: Graduate Library School, Attn: SCIL, University of Arizona, 1515 East First Street, Tucson, AZ 85719.



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## Xerox Joins Personal Computer Field

The list of entrants in the personal-computer field continues to grow as Xerox enters the fray.

With the announcement recently of its 820 information processor, the firm takes another step on the road to providing a complete list of machines for the automated office.

The 820 is a low-cost, soft-loaded text editor and desktop business computer. It consists of a CPU and memory (64k bytes), a keyboard and two mini-floppy disk drives for \$2995.

The customer must add software to this package to get it to work. And the software will cost more. The company's price sheet states that one software package is mandatory with any purchase, and the least expensive listed software package, CP/M, is \$200. The word processor costs \$500. All prices are single quantity.

Other hardware available includes an eight-inch disk drive and a 40-cps printer. The printer costs \$2995, while the drive ups the cost of the basic system to \$3795. And, of course, software costs the same whether the package is on mini floppys or on the larger disks.

Other software that's available includes Teletype communications, M BASIC, C BASIC-2, COBOL 80, M SORT and an electronic worksheet package. The CP/M and the 3270 emulation (communications) software are now also available for Xerox's 860 information processor.

The 24-character  $\times$  80-line display is housed in the same unit as the processor and the 64k of memory. Also included in the package are two RS-232-C serial ports and two parallel ports. The keyboard can generate all 96 ASCII characters, and has a 10-key numeric pad for calculator-like numeric data entry.

Xerox expects that it will sell 10,000 of the 820s in 1981. The firm says that it will get a foothold in the office with this low-end machine, and users will migrate up from it.

The 820 has been granted Class A FCC certification. It is suitable for office, not home use. For further information: Xerox Corp., Office Products Div., 1341 W. Mockingbird Lane, Dallas, TX 75247; (214) 689-6044.

## Japan Show Sees Latest Computer Hardware

From cars to watches, the Japanese have managed to gain a firm foothold in the product market in the United States and several other countries. And it looks as though the Japanese companies will do the same in the personal-computer market. With the ready availability of the high-technology components needed for the microcomputers, the Japanese have assembled a formidable array of computer systems.

At the Japan Microcomputer Show, recently held in Tokyo and supported by the Ministry of International Trade and Industry (MITI), close to 100 companies showed off the latest hardware and software. Of these companies, only eight are not headquartered in Japan—Tandy (Radio Shack), Commodore, Motorola, Texas Instruments, Rockwell International, Apple, and Personal Computing Magazine with its Hayden Software.

Not restricted to personal- and business-computer companies, the show included several

companies that offer program-development systems or peripherals such as disk drives, terminals and printers. Software firms were abundant, and high-level languages such as Pascal, COBOL, FORTRAN and BASIC were readily available. Additionally, many of the Japanese computers take advantage of the software and operating systems developed in the United States; many systems use the CP/M operating system developed by Digital Research, and thus can take advantage of the large number of programs that run under CP/M.

### Small systems

More than two dozen manufacturers showed off at least as many models of small systems. Some of the companies—Sharp, Nippon Electric Corp. (NEC), OKI Electric, and Hitachi—have already shown their systems in the United States and in some cases are already selling them. Of these companies, three are using Z80 8-bit microprocessors





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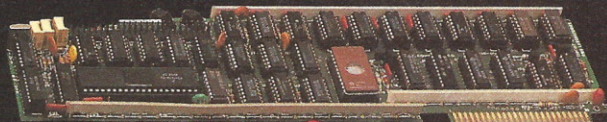
Apple II computer. It also interfaces to all Shugart/ANSI Standard Eight-Inch Floppy Disk Drives. The A800 provides complete IBM format compatibility in both single and double-density modes.

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CIRCLE 5

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\* TRS-80 is a trademark of Radio Shack, A Tandy Co.



as the "brains" of their systems, which can thus run CP/M. This, in turn, lets the computer use the many programs that are compatible with the operating system—from general accounting packages, to engineering programs, to entertaining game software.

Sharp's MZ-80B was the only machine displayed at the show that had a built-in cassette deck for low-cost magnetic storage of programs and data. Also built into the unit is a green phosphor monitor, thus providing a sleek looking, all-in-one package that costs about 278,000 (at press time, 220 yen = \$1) for the basic model. The OKI IF-800 Model 20 also offers a built-in monitor and magnetic storage—but the monitor is color, and storage is on dual 5.25-inch minifloppy disk drives. The system also has a built-in printer, thus truly providing an all-in-one system for the user. It also comes with a hefty price tag—approximately 1,200,000 yen.

Offering the user more of a choice both the NEC PC-8001 and the Hitachi MB-6890 start out as just a keyboard/processor assembly and permit the user to select options as desired to build the final system. Users can select either a black-and-white or color monitor, tape or disk storage, serial and par-



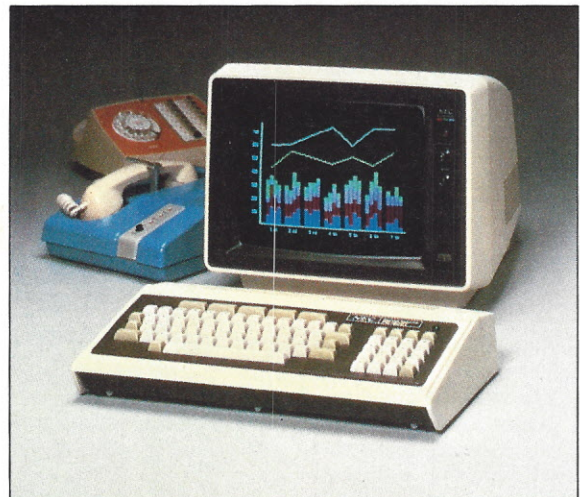
National's C-18

allel interfaces, and, just recently offered by NEC, are light-pen and voice-entry options. The base price of the Hitachi system is about 298,000 yen while the NEC system comes in at a low 168,000 yen. Why the major difference in price between the NEC system and the other two moderately priced units? Simplicity. The keyboard on the NEC PC-8001 has fewer keys than the keyboard on the Sharp system, and it uses some advanced large-

scale integrated circuits to cut the number of components inside the system.

The Hitachi system takes advantage of a newer microprocessor called the 6809, an 8-bit processor that has some of the features included in many 16-bit microprocessors. The other three systems, though, use a Z80 microprocessor, and are CP/M-compatible. Since the Hitachi system uses the 6809, it will not be able to use the CP/M-compatible software. Instead, it will have to use operating-system software written specifically for 6809-based system, or use programs that are written in BASIC for transportability.

Also on display at the show were several computers developed by Canon. These units provide the user with two convenient system options. The first system, the BX-3, is totally integrated—the



NEC's PC-8001: Permits user to select options and build the final system

printer, disk drives, keyboard, and a single-line alphanumeric display are in one package. Price for this compact system is about 1,480,000 yen. Offering the user more of a system-configuration choice, the CX-1 comes with a built-in 12-inch CRT and minifloppy disk drives, but requires an external printer, which the user can select to suit his personal or business needs.

For both the CX-1 and BX-3 there are plenty of options, from additional disk drives to IEEE-488 parallel interfaces. And the memory space is expandable in 32 kbyte sections up to a maximum of 96 kbytes in the case. The available options can be used on either system by connecting them to the system bus port or to one of the serial-interface ports.

Another of the well-known consumer companies, Casio, also introduced a personal-



computer system—the FX-9000P. With a 5.5-inch CRT for display, the desk-top system uses plug-in cartridges which contain the various option memories and control interfaces. The basic unit consists of the keyboard master with the CRT display and a minimal amount of memory—4 kbytes of RAM and 12 kbytes of permanent ROM, which contains the company's CA-BASIC software.

The CRT display can handle graphics, and in the character mode can display 16 lines of 32 characters. The base price of the machine is 1,490,000 yen with additional memory available at 19,000 yen (for 16 kbytes of dynamic RAM) or about 23,000 yen for 4 kbytes of very-low-power CMOS RAM. Additionally, an I/O expander module that includes a printer interface, a cassette interface, and a buffered system bus interface can be purchased for about 35,000 yen.

Unlike most other computers, the Casio unit has its keyboard marked with the various BASIC in-



Toyo Telesonic's AVC-777: An engineer's dream machine

structions above each of the normal alphanumeric keys. The computer also comes with a separate numeric keypad.

### Computers for Japan

The Japanese manufacturers also have a wide array of units that will not be sold in the United States and other countries for one or both of the following reasons:

1. The system does not meet the stringent FCC requirements for emitted electrical noise, and to



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13



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CIRCLE 7

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## OUTLOOK

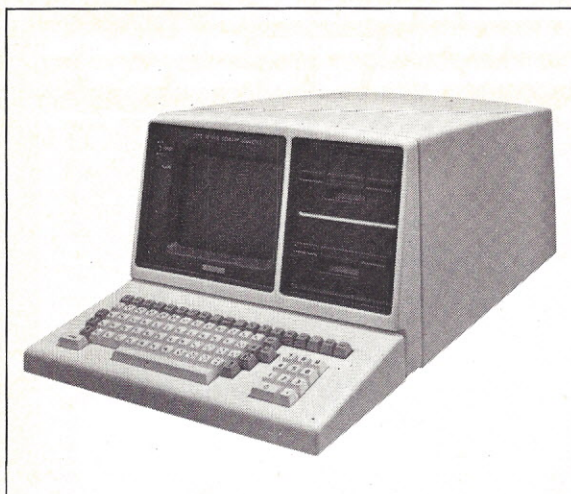
meet those requirements would mean a total redesign of the system.

2. The company cannot support the software or hardware to provide the U.S. base with fast turnaround when the systems go down.

### High-tech

Included in the variety of hardware unveiled are two extremely high-technology systems—the Fujitsu Micro-8, and the Bubcom-80 from Systems Formulate Corp.

Both systems start with a console keyboard that has more than 90 keys and the capability to use small bubble-memory cartridges that plug directly into the console. On the Fujitsu unit, the bubble cassette holders are optional; on the Bubcom-80, one holder comes as standard and a second one is



Ando Electric's AE801: 9" CRT, 64k RAM, 4k ROM

optional. Each of the bubble cassettes can hold 32 kbytes of information—about 10, single-spaced, typed pages. The bubble cartridges provide the user with a compact and nearly indestructible non-volatile form of data storage; since there is no tape or disk to wear out, the cartridges have an infinite life.

The Fujitsu Micro-8 actually uses two micro-processors—one to control the keyboard and display, and the other to perform the actual data processing. The unit also has as an option a third processor (a Z80) so that the system can run CP/M. The base price of the Micro-8 is about 218,000 yen, with everything from the monitor to the bubble cassettes costing extra. Prices for the options range from about 4,500 yen for an RS-232 interface, to 100,000 yen for a high-quality color monitor. The special circuits for the bubble cassettes cost 85,700



yen per holder and then the cassettes cost about 35,000 yen each.

Also available on the Micro-8 are many high-level languages—UCSD Pascal, FORTRAN, or BASIC for use with the main processor's operating system, or anything that will run under CP/M when the auxiliary processor is used. Of course, to run these operating systems, a dual mini-floppy disk drive is available. For users who wish to program in Kanji (Kanji is one of three Japanese character sets, as is Katakana), the keyboard and display system provide 128 kbytes of permanent memory for character display as well as over 50 kbytes of writable display memory. The programmer also has another 64 kbytes of memory in which to develop programs.

In comparison, the Bubcom-80 contains many of the same features but with only a 160 x 100 dot graphics capability instead of the 640 x 200 dot resolution offered by Fujitsu. With a color display, the Bubcom-80 can be ordered with a high-resolution graphics card to provide the same reso-

lution as the Fujitsu unit. Like the Micro-8, the Bubcom-80 can operate in two character modes—English or Katakana.

Systems Formulate offers several larger systems packages. A Standard Business System, consists of the keyboard unit, an 8-inch disk drive, 132-column dot-matrix impact printer, green phosphor display and dual bubble holder. The floppy interface can control up to four external drives. The system can also handle Kanji fonts through the use of a font generator which is optionally available on a disk.

Also taking advantage of dual microprocessors inside the computer, Sanyo announced the MBC-2000 Model 7. This system uses a green phosphor, 12-inch CRT and has everything but the printer integrated into a single package. The system offers a choice to the potential buyer: dual mini-floppies or dual 8-inch floppies can be built into the system.

Based on the Multibus system developed by Intel, the computer has three independent memory

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**ASTRO-QUOTES** This is an anagram-type game. The goal of the game is to guess a famous quotation. Clues are letters that the computer inserts in the correct slots in the quotation when the player correctly guesses the definitions of a series of words.

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CIRCLE 9

## OUTLOOK

areas inside the box. Each processor has a local memory that permits rapid access to information; the system also has a "global" memory that can be accessed by either processor. After purchase of the system, little else will be required for expansion. Included are two serial ports, a printer interface, the disk controller, a real-time clock, and a direct-memory-access controller.

Offering an array of business system products, Sord Corp. lets the user select just the level of performance needed. From the high-end M416 hard-disk system with color graphics, to the new, low-cost M20 personal computer, Sord offers the user the flexibility of building the right system. The low-end M20 uses a keyless board, with all the keys screened on a touch-sensitive panel. Sord also offers a next step up—the touch keyboard is replaced by a moving-key assembly.

Putting a system all together in a trim office-compatible cabinet, AI Electronics has displayed its ABC-24 series of microcomputers. All systems are designed around the Z80 microprocessor. The company has developed an extensive library of software for the systems and does not have to rely on CP/M for an operating system or utilities. Additionally, AI Electronics offers a full line of I/O and peripheral support equipment, which includes about 150 different interface cards.

Going to a 16-bit microprocessor to get higher performance, the Packet 68000 personal computer made by Anritsu comes with a 64 kbyte memory space that can be expanded to 320 kbytes. Using the 68000 16-bit processor, the system includes dual mini-floppies for data and program storage, a 9.5-inch CRT for data display, and a built-in thermal printer. The keyboard contains dual mode keys (English and Katakana) and extra user-programmable keys.

The base system price of the Packet 68000 is 1,500,000 yen, but the system is complete; no other peripherals are needed unless a better print output is desired. The display provides a 64-character x 21-line format, and the user can select from many interface options some of which are, including IEEE-488, 8-inch floppy-disk drives; serial I/O port; and analog-to-digital converters.

Also based on a 16-bit processor, a small-business system developed by Mitsubishi will be available in the second quarter of 1982. This

*continued on page 101*



# KNOWLEDGE IS POWER

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- Are systems prices going to come tumbling down?
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The crowd doesn't know about personal computers yet. But it's catching on fast. This year over a million people will buy personal computers. By 1985 over ten million people will own one, bringing enormous changes in the way we live and work. One thing won't change though. The people getting the most from their computers will still be subscribing to PERSONAL COMPUTING magazine. See for yourself. Send for your trial subscription today.



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Robert Heltman manages organization and manpower for General Electric. He computerized to organize.

Maureen McCourt's company does market research and statistical analysis. She computerized to analyze.

One thing is certain: Because of personal computers, their work-lives are more productive and better organized. Another thing is highly possible: Their way of thinking has changed.

---

Almost two years ago, Steven Stadler, chief financial officer at GenRad Inc., a Concord, MA, manufacturer of automated test equipment, bought a personal computer to play with at home. He found out about VisiCalc and started doing some spread-sheet analysis and modeling.

Amazed by the extreme power of the tool, Stadler told his office financial staff about it, and met with a resounding response of "Oh yeah? That's interesting."

Not to be dissuaded by the resistance that often accompanies attempts at personal-computer introduction, Stadler devised a scheme to circumvent the negativism.

"I decided that I would put on a little demonstration for them. I had six members of my staff come to my home for a whole day to see what could be done. After that I just sort of got out of the way. One or two of

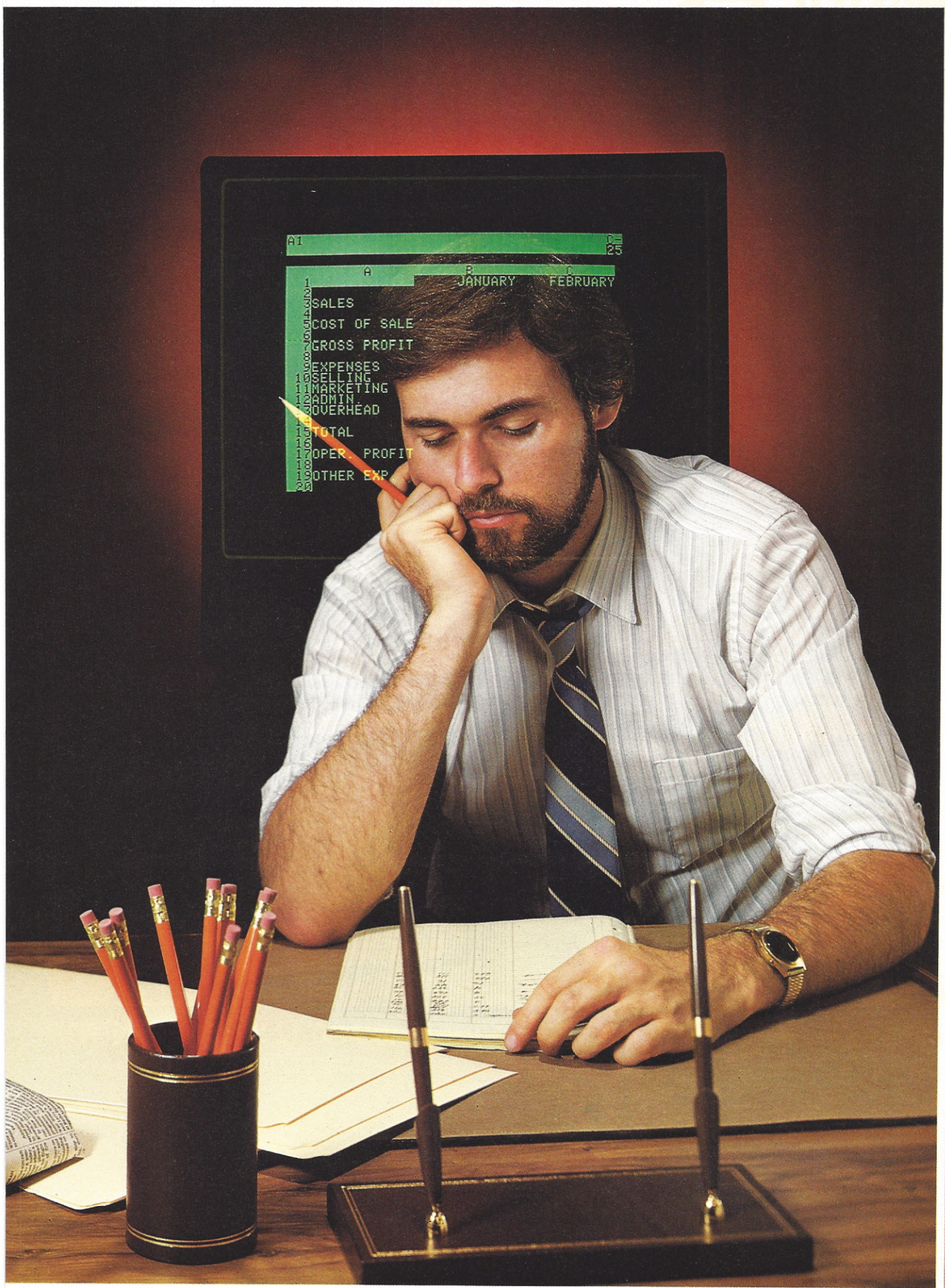
## PROFESSIONAL COMPUTING

# Consciousness- Raising By Computer

Does computing change the way you think? The evidence would seem to indicate that it does...





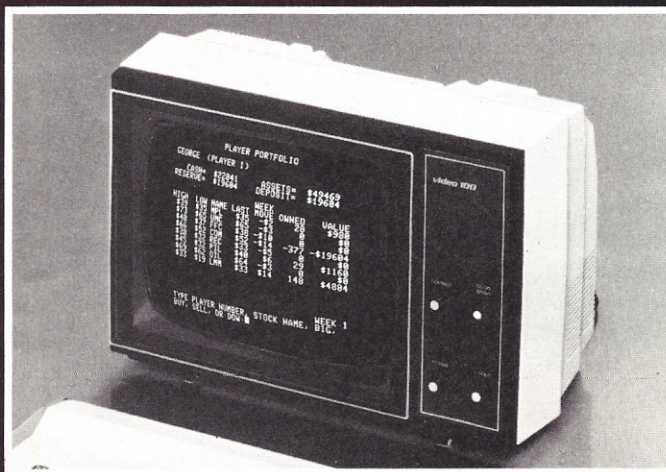




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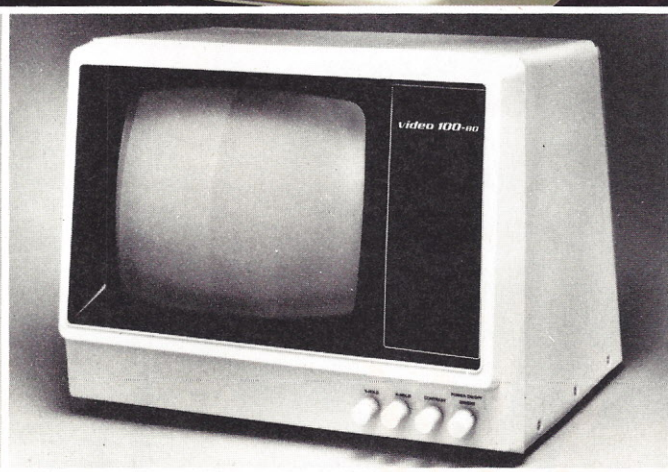
The Amdek 13" Color Video Monitor is ideal for all personal and business computing applications. Bright jitter-free text allows viewing over extended periods without causing eye fatigue, especially in word processing applications. The low resolution display provides 40 characters wide by 24 characters deep with 260 horizontal lines and 300 vertical lines.

This compact, lightweight monitor (only 25 lbs.) has a molded-in carrying handle, making it easy to move. Its industrial grade construction and shatter resistant case provide reliable service in both office and industrial environments. All front mounted controls make it easily adjustable at a glance without the loss of a single keystroke.



### VIDEO 100 12" B/W MONITOR

This highly reliable 12" black and white monitor features a 12MHz band width and 80 character by 24 line display. Plug-in compatibility with Apple, Atari, Radio Shack, O.S.I., Micro-Term and Exidy make this the perfect text display for almost any system.



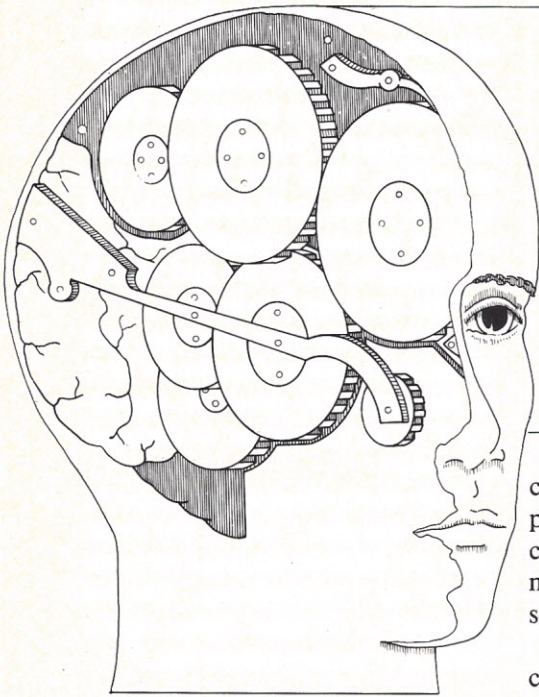
### VIDEO 100-80 12" B/W MONITOR

The model 80 features an industrial grade metal cabinet with built-in disk mounting capability and space for an 11" x 14" PC board for custom designed electronics. Front mounted controls include power, contrast, horizontal hold, vertical hold, and brightness.

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One is forced to think logically: that's the discipline of a machine. You have to be explicit. You cannot be implicit with a personal computer.

them started running with it and demonstrating successful uses.

"It was one 'wow' reaction after another, and it spread like wildfire. We now have 22 personal computers."

The skeptical six who visited Stadler that day were familiar with mainframes, which GenRad has access to, but they were unfamiliar with the power of the personal computer. To Stadler, this was an important threshold for his staff to cross.

The initial resistance can be attributed to a peculiar form of prejudice that arises with technological innovation, wherein no attempt to understand is made. Stadler successfully overcame this prejudice of his staff "because I was comfortable with personal computers. If what I hear is correct, this is somewhat unusual for a senior manager."

Stadler's team works on financial analysis, cash management, general-asset management, consolidation accounting, managing some of GenRad's foreign businesses, cost accounting, statistical analysis, and sales forecasts. The company has ac-

cess to a mainframe for financial reporting, but is using its personal computers primarily for planning, modeling, variance analysis, and speculation.

How does this use of 22 computers change the way Stadler's people think? "The positive aspect of it is that people are able to generate meaningful reports very rapidly and therefore are likely to act more rapidly than they would otherwise. One is forced to think logically; that's the discipline of a machine. You have to be explicit. You cannot be implicit with a personal computer."

Stadler's theory is supported by Maureen McCourt of the Weston Group, a Westport, CT, marketing-service firm for consumer package goods companies. Manager of computer services, McCourt used to be afraid of personal computers: "Your mind really has to work in the beginning to understand what the computer is doing. With a computer, your mind has to think logically because the computer works logically. You start applying more logic with everything you do. It becomes part of the way you think in all aspects of your life."

McCourt's department runs four computers. "When you're running three or four at a time, you have to be able to think things out faster. This results in an attitudinal change as well: It makes you want to work

faster because you see what can get done when you do."

But the prejudice against technology has reared its head at Weston Group, too: "I've put a lot of people on the computer and seen a negative reaction: They feel that they cannot do anything mechanical. It's a fear of the machine—whether it's a computer or a copy machine—they feel they'll never learn it. But I did, and it's changed my self-image. It makes me feel smarter. I now know something that a lot of people don't know. You come to respect the computer and what you can do with it. I used to ask, 'Can I do it?' Now I say, 'I want it done.'"

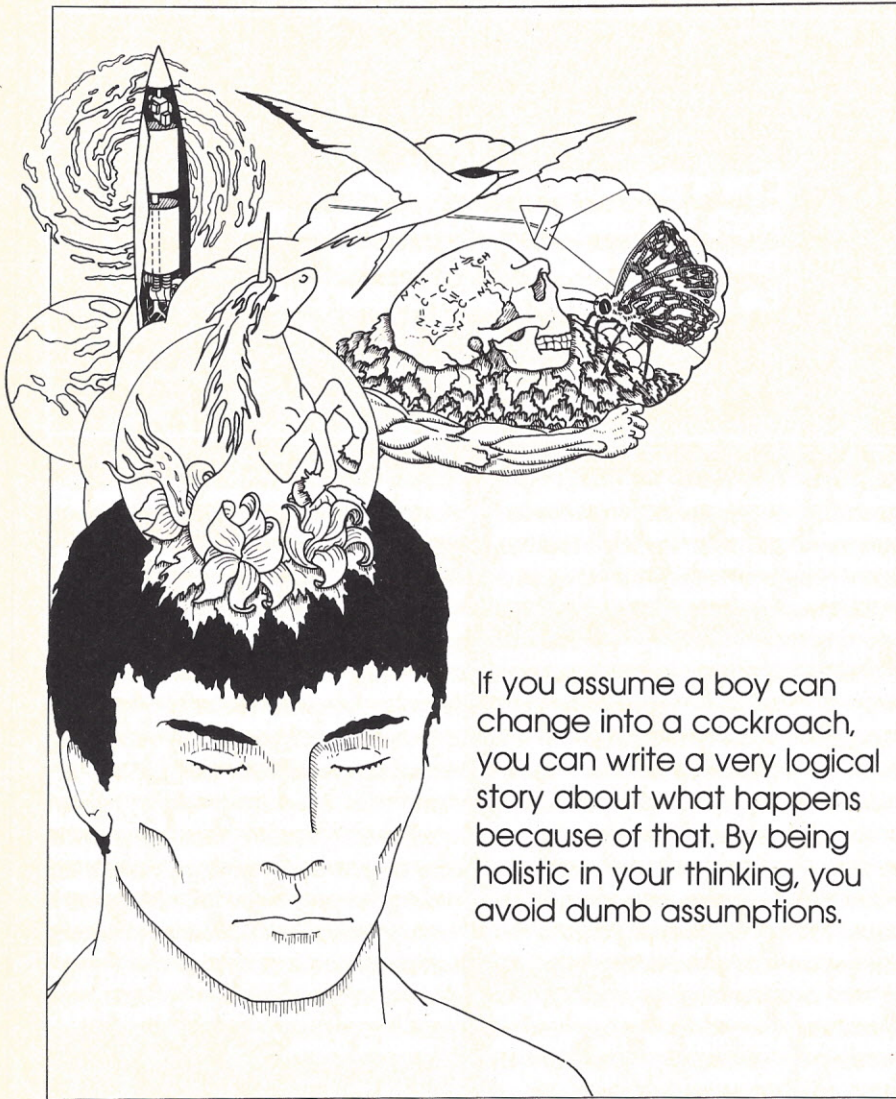
## Down home

Used to be a farmer named Jeff Moler couldn't get it done. Owner of M&M Fertilizer and Chemical Co. in Charleston, IL, Moler fertilizes farmers' fields. With a yearly volume of about \$1.5 million, Moler would sit down, lick his pencil, and start ciphering.

"We were doing all our billing and accounting by hand. We couldn't get the billing out fast enough in season. As a result, when we got down to the end of the season, which in farming is not a long season, we couldn't keep up with it."

Consequently, Moler computerized two years ago. Today, all his billing and accounting is done by his





If you assume a boy can change into a cockroach, you can write a very logical story about what happens because of that. By being holistic in your thinking, you avoid dumb assumptions.

computer. And in Moler's case, he has to think *less*: Crop information, correct fertilizer combinations, per-acre applications charges, cost per acre, cost per ton, and total acreage costs are worked out on his Apple.

"No one was afraid to use the computer, and now I couldn't do without it. Our billing jobs are done at the end of the day. At the end of the month we can tally everything, at the end of the year, we push a button and our complete income tax is done."

## Power at GE

Whereas Moler thinks less with his computer, Robert Heltman thinks

more with his. Manager of organization and manpower for General Electric Co.'s Transportation Systems Business Division, Heltman decided a year ago that "we're in the middle of a damned microelectronic revolution. I said to myself, 'Do I care?' I decided that I care a lot. I thought that if I got a personal computer I could do a lot with it. I'd have to learn how to program it. I'd have to make that my new avocation. But I think it's worth doing."

Heltman shopped computer stores, read computer books, and talked to computer people. He talked to his boss about the proposed purchase. His boss told him

that he'd have to sell the idea to GE's data-processing department before the purchase could be made.

"It boiled down to my own CISO gang [computer information service operation]. They told me that if I had that much motivation, I should write a proposal regarding what I was going to use it for and what I thought the payoffs would be."

Heltman wrote the proposal, and the data-processing department gave its blessing to the purchase, regarding it as an experiment in personal computers.

"The one condition I had to put in writing was that I would not drain them [the dp personnel] as a resource to do my programming. They're budgeted to do other things, and I found that request reasonable."

## Soldering-iron engineer

Heltman attacked computing with a tremendous amount of personal motivation. He had two goals: One was his own education and his position in the microelectronic revolution. "I wanted not to become an electronics nut, but to have a layman executive's appreciation for all that technology. I wanted to understand as much as I could within the reasonable constraints of time. My goal wasn't to become a soldering-iron engineer, but an applications expert. And, of course, my second goal was to increase productivity."

Did it change the way Heltman thinks? "It wasn't the kind of change that would have occurred if someone had jammed computers down my throat. It was an evolving, learning process that was sometimes frustrating. I would get hung up on how to get something done and couldn't figure out how. There were times I wanted to take that little personal computer and drop-kick it right out the door.

"But now, practicing with each software package is like learning a

*continued on page 88*



## 3 Computers Debut At Consumer Show

Three personal computers were introduced at the recent Consumer Electronics Show in Chicago. Two are from Casio and are completely new, while the third is a redesigned computer from Texas Instruments.

The Casio units include a desktop personal computer, the FX-9000P, and a hand-held computer, the FX-702P. With a list price of \$1199, the FX-9000P comes with 4k of CMOS random-access memory (RAM) and 12k of read-only memory (ROM).

A unique feature of the Casio computer is its use of CMOS RAM cartridges that contain integral battery backup power supplies. This makes it possible to store programs in a RAM cartridge and then remove the cartridge from the machine without losing the program. Although final specs are not in yet, Donnie Coffelt, national sales manager for Casio in Fairfield, NJ, says that current estimates are that the battery will hold data in the CMOS RAMs for about three years.

While the basic computer comes with only 4k of RAM, additional 4k RAM cartridges will be available for \$189 each. A maximum of 32k of RAM can be connected at any one time. Shipping of units will begin in October, Coffelt notes.

The second computer introduced by Casio, the FX-702P, is labeled a programmable calculator, but it has a full alphanumeric display and keyboard and accepts programs written in BASIC. It has a 64-switch keyboard and a 20-character liquid-crystal display. In addition to standard BASIC commands, the FX-702P also has a special set of commands to handle statistical deviations and linear regression.

According to Coffelt, the handheld unit will sell for \$199.50 and should already be available by the time you read this. Storage capability ranges from 1680 steps with 26 memories to 80 steps with 226 memories. The unit requires two lithium batteries, which are expected to last 200 hours.

The third computer shown at the Chicago show is a redesign of an earlier one. Known as the TI 99/4A, the Texas Instruments computer features a standard typewriter keyboard. Except for the keyboard and the price, the 99/4A is identical to the 99/4. Because the keyboard is an integral unit, TI was able to save 70 manual operations in the fabrication of the computer. As a result, the 99/4A at \$525 is \$125 cheaper than its predecessor.

The new unit should be available in retail stores by the middle of August.

## High-Speed Printer Technology Promises Cost, Reliability Gains

David Gabel

Personal-computer users might not see it for quite a while, but the world was recently made aware of a new technology for non-impact printing. Ion-deposition imaging, developed by Delphax Systems, a new Canadian company, promises to greatly reduce the cost and improve the reliability of non-impact printers in the future.

The technology is embodied in a printing mechanism called the Delphax Model 2460. It is the basic mechanism needed to put marks on paper, and nothing more. The company says it is a mid-range model in its 2400 series, but the 2460's \$8000 price ticket (in 500 quantities for the OEM) means that the technology won't be showing up in small systems in the near future. But Stephen Dunik, vice president of research, development and engineering, says the company is working on some refinements that should bring costs to the point where

small-business systems integrators could begin to take notice.

The present product is aimed at those applications that produce between 2000 and 20,000 pages of output per day. This is the area that, up until now, has been served by the laser printer, a class of non-impact printers which are generally faster than are impact printers. They get their speed from the absence of moving parts used in the actual character formation in impact printers. Non-impact printers generally have better print quality than do impact printers. But they get their speed and print quality at the cost of poor reliability and high price. Many of the printers in use today in high-volume applications cost well over \$100,000 and require the services of a customer engineer about every other day, according to Delphax.

Laser printers use the Xerography principle.



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## OUTLOOK

This is the technique of placing an image on a rotating photoconductive drum through the impingement of light on the drum. Areas for the light to strike can be obtained from a document of which a copy is desired, as is the case with an ordinary office copier, or electronically, as is the case with laser printers.

Unfortunately, says Delphax, the high cost and poor reliability that have devilled the laser printer in the past will continue to do so. This is due to physical limitations of the technique itself. Thus the company developed its new technique, which places charges on the image drum through the action of a simple, printed-circuit type of device that's rated at 100,000 copies, and then can be replaced by the operator. This one piece, with no moving parts, replaces a laser, electronic switch and rotating mirror.

This and other mechanical simplifications, Delphax claims, will allow end-user printers employing the 2460 to be built for about half the cost of current laser printers. And the average time between service calls should be about ten days.

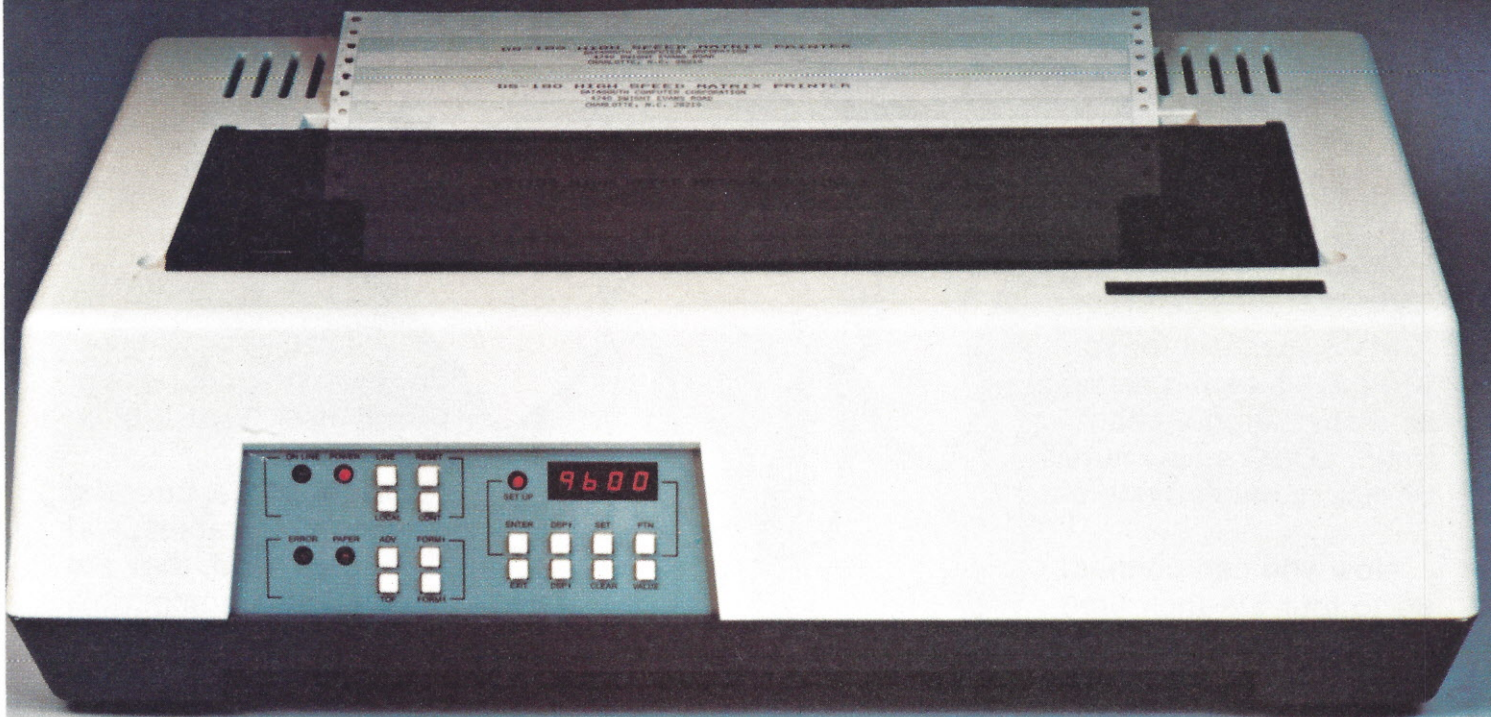
The printer mechanism will handle pages in three different sizes (8½ × 11, 8½ × 14 and metric standard) with a printing width of 8.53 inches. It prints with a throughput of 60 pages per minute, which is either half as fast or one quarter as fast as laser printers, depending on the model. At that speed, says Delphax, the mechanism is appropriate for many word- and data-processing applications.

The 2460's dot-matrix characters should prove no deterrent for word-processing applications. The machine prints with a dot density of 240 dots per inch in each direction. This is better than the dot density available on many electrostatic printer/plotters found in engineering laboratories, which weigh in at 200 dots per inch. So the characters formed by the 2460 look almost like fully formed characters. And, Delphax is happy to point out, the printing is superior to that of the old workhorse 1403 printer from IBM, which is easily recognized as "computer printing."

Delphax president Gary Ampulski bases his company's reliability claims on the hours of testing the product has undergone in the seven years it has been under development. In that time, literally millions of pages have been printed. So the firm has confidence that its figure of 200,000 mean copies between failure is a good one. At that rate, and assuming the machine produces 20,000 pages per day, the mean time between failures turns out to be ten days.



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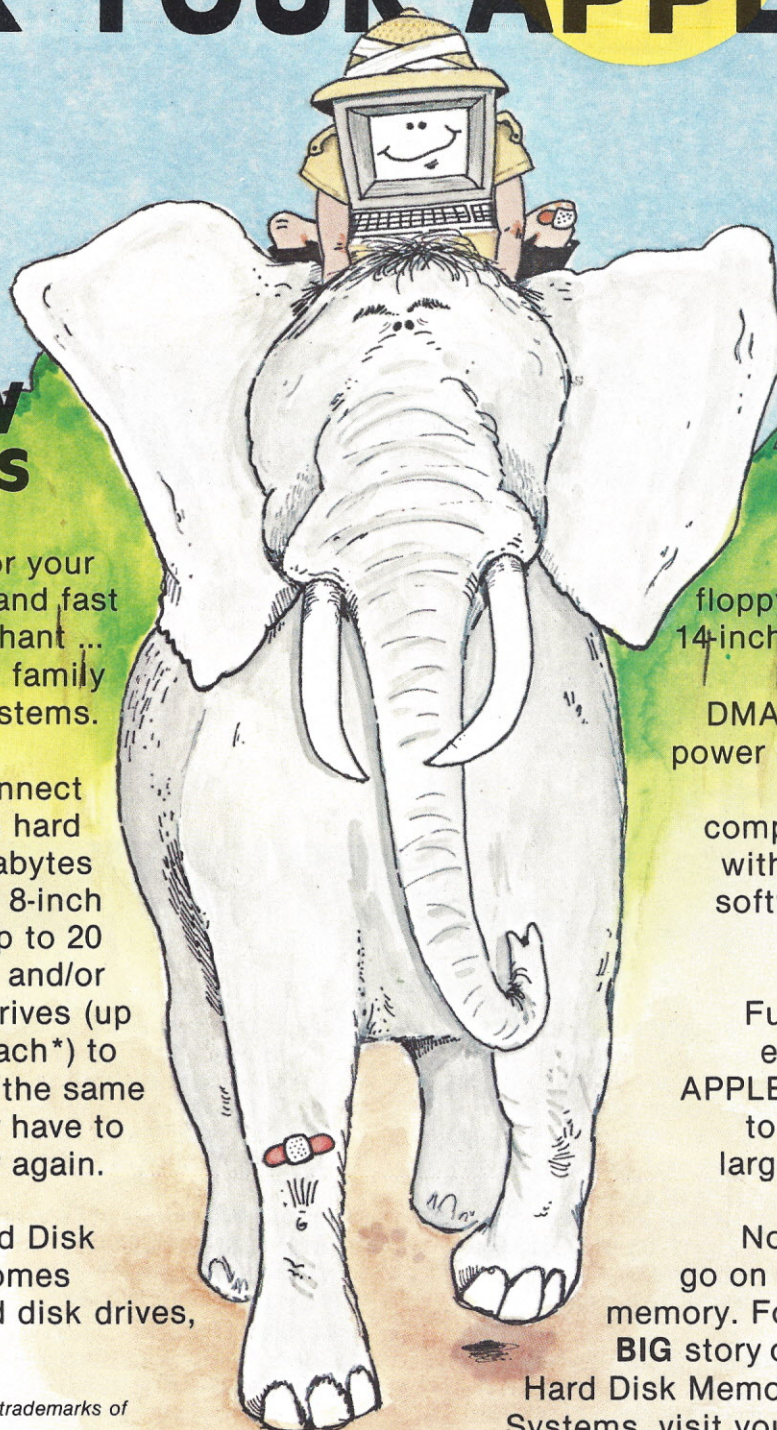
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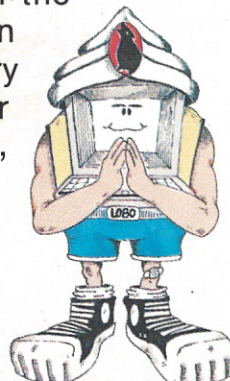


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## BUSINESS COMPUTING

# General Ledger Packages Streamline Businesses

**Every business has to do a general ledger. Computers make the job relatively easy, especially as vendors improve their general-ledger software products.**

**D**on DeRespinis, a certified public accountant in Bethel, CT, has a client who bought a computer six months ago. His client's computer and its general ledger software, both customized systems, still do not work. On the other hand, DeRespinis bought Peachtree general ledger software about a year ago at the same time he bought a Vector Graphic system, and he has not had any trouble with the software since he bought it.

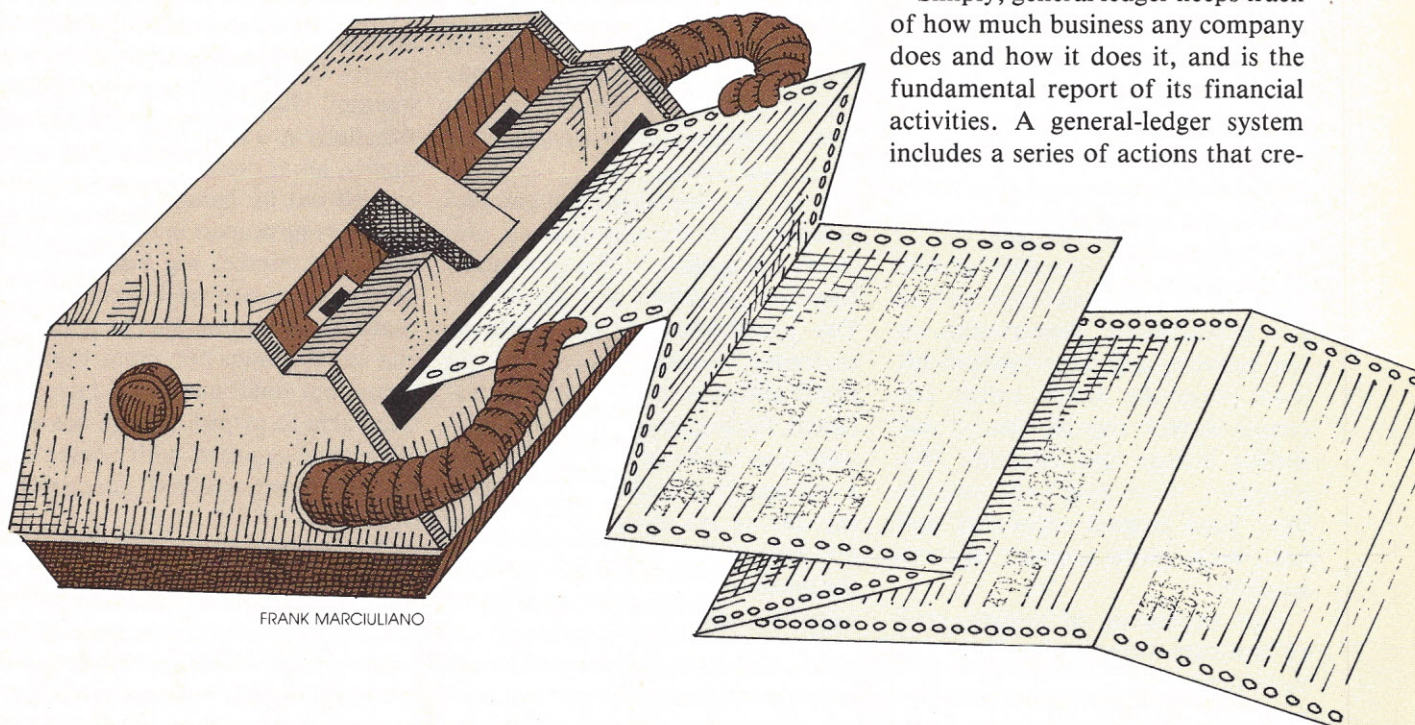
Even better, he says he saves up 80 percent of the time he used to spend poring over his monthly client write-ups and posting the accounts by

hand. The moral of this short, short story? Many well-written, proven general ledger packages are yours for the asking. Most accountants in private practice or small businesses with their own bookkeepers would be foolish to commission customized G/L software these days for that simple reason.

And almost all G/L packages have user-definable account numbers; a large number include flexible report generators (a few have practically unlimited flexibility); and a wide range of packages are available to match any size small business.

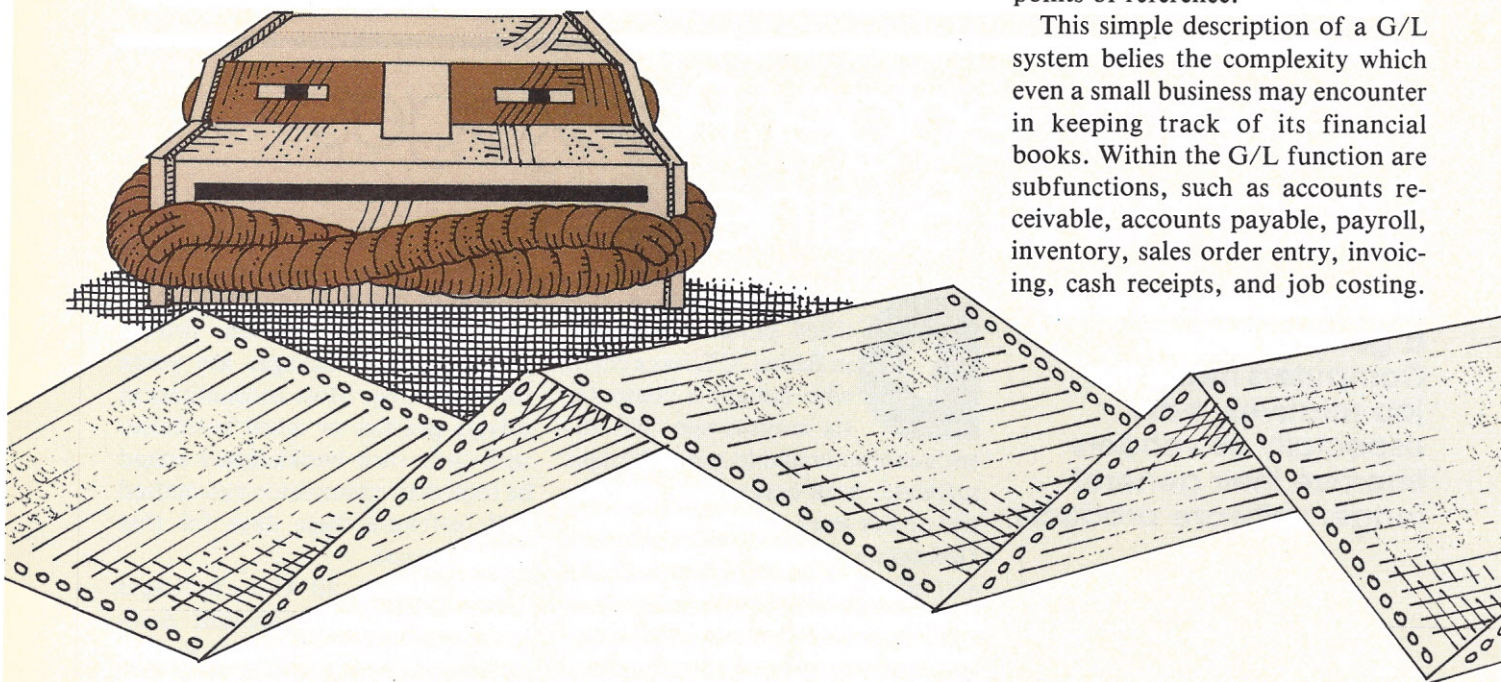
### What is general ledger?

Simply, general ledger keeps track of how much business any company does and how it does it, and is the fundamental report of its financial activities. A general-ledger system includes a series of actions that cre-



FRANK MARCIULIANO





financial information into common formats, so everyone has the same points of reference.

This simple description of a G/L system belies the complexity which even a small business may encounter in keeping track of its financial books. Within the G/L function are subfunctions, such as accounts receivable, accounts payable, payroll, inventory, sales order entry, invoicing, cash receipts, and job costing.

ate journals and generate reports that define and describe these activities. The most important of these is cash management: Each general ledger measures how cash and income is received and earned and how it is spent or disbursed. While many simpler, microcomputer-based G/L systems incorporate these activities into an overall profit-and-loss statement, many others maintain cash receipts and cash-disbursements journals and print monthly or periodic reports about both functions.

Other common elements of any G/L are sources of non-cash income and expenditures: depreciation on real property and plant/equipment; loan proceeds; taxes owed; tax credits earned; payroll checks; and similar income and expenses. Historically, these non-cash sources have been treated separately and have been given separate account numbers.

Any movement of money—cash or non-cash—into or out of a business involves a transaction, and the purpose of the daily working of a

G/L is to record—accurately and in good order—every transaction involving a company's finances. Putting these transactions into a permanent record and in order is called "posting." After a group of transactions is posted, it can be reproduced in a report called a "transaction listing." A permanent, continuous record of all of these transactions—in the proper order—is called a "general journal."

From the general journal and records of all of the transactions, you create "snapshots" of a company's financial condition and operation. The profit-and-loss or operating statement measures a company's profitability—income versus expenses for a given period of time—while the "balance sheet" measures a company's overall financial standing, taking all assets and liabilities into consideration. These snapshots are taken so business owners or managers can gauge, evaluate and compare the company's financial performance at any time to its performance at any other time. G/L also puts all

In companies with sufficient sales and transaction volume, these subfunctions are divided into their own departments or units, while in most small companies, they are all included in the overall G/L.

Larger companies, in which the subfunctions are separate from the overall G/L, must periodically "integrate" the activities of the subfunctions into the G/L. Before computers, all of these integrations were carried out by hand, a tedious and error-prone process in the best of offices. Of course, big business and government have used computers to maintain and integrate the accounting subfunctions for more than 20 years, but small businesses have not been able to afford or were not well enough acquainted with computers to use computerized accounting systems.

The fledgling personal-computing industry borrowed a leaf from its mainframe and mini cousins in 1976; among the first software ever produced for personal computers was elementary small-business account-



ing software. Most of the authors of these first G/L programs assumed that small-business men would be enamored of personal computers and would want to learn computer operations. Of course, that was a false assumption, because most small-business people have neither the time nor the inclination to learn computer operations.

But during the past three years, the software industry has recognized

willing to spend a few hundred more dollars for these advanced features, more software houses will revise and enhance their G/L software. Compared with the cost of G/L and accounting packages for minicomputers, even the most expensive micro-based G/L can seem like a bargain.

For example, Jerry Carter, who owns two lumber yards and some real estate in Mission, TX, paid a total of \$600 for a VANDATA (Seattle, Wash.) G/L package and installation help. "I thought that if it worked at all, it would be a steal," he says. "It has turned out to be an

excellent buy; my accountant told me it would save me more than it cost in his fees each year. The program takes care of everything he used to do for me each month except figure depreciation."

### Who's who in G/L?

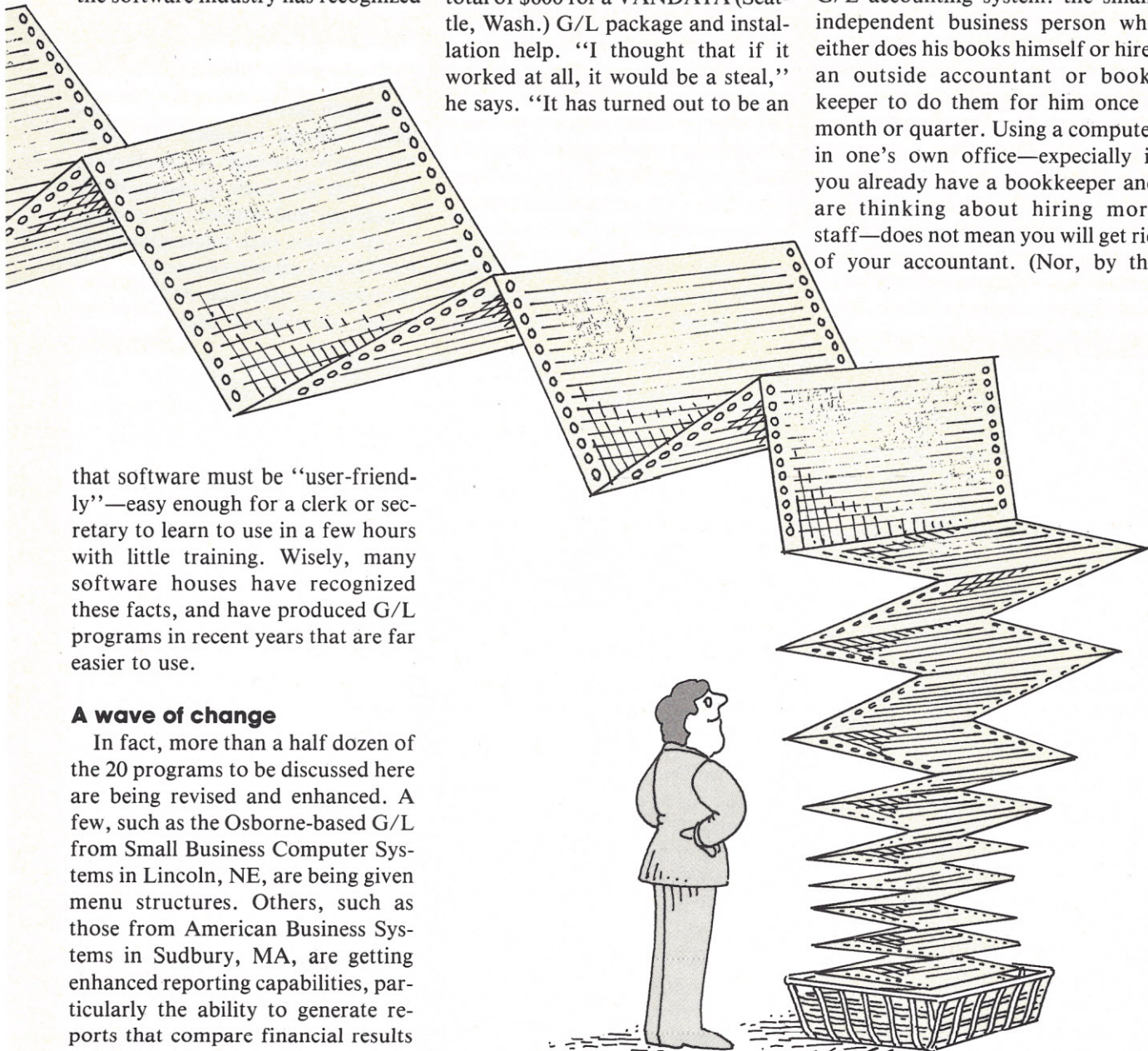
Carter is also a good example of one of the two types of people who can best benefit from a micro-based G/L accounting system: the small, independent business person who either does his books himself or hires an outside accountant or bookkeeper to do them for him once a month or quarter. Using a computer in one's own office—especially if you already have a bookkeeper and are thinking about hiring more staff—does not mean you will get rid of your accountant. (Nor, by the

that software must be "user-friendly"—easy enough for a clerk or secretary to learn to use in a few hours with little training. Wisely, many software houses have recognized these facts, and have produced G/L programs in recent years that are far easier to use.

### A wave of change

In fact, more than a half dozen of the 20 programs to be discussed here are being revised and enhanced. A few, such as the Osborne-based G/L from Small Business Computer Systems in Lincoln, NE, are being given menu structures. Others, such as those from American Business Systems in Sudbury, MA, are getting enhanced reporting capabilities, particularly the ability to generate reports that compare financial results from one period to the next.

As more business people seem





way, does your accountant's purchase of a computer mean that his or her fees are going to drop by half.) But both situations mean gaining much better control of your company's finances, saving a lot of wasted time, straightening out messy situations, producing reports a banker will smile at, and, probably, saving money in the long run.

By far the biggest group of purchasers of micro-based G/Ls to date has been CPAs, accountants, bookkeepers and auditors who specialize in small-business record-keeping and accounting. (See the accompanying story about Sally Rembold of Kansas City, MO) Most of their small-business clients have not yet obtained their own computers, so their clients primarily benefit from quicker, more accurate and more understandable monthly and annual reports and financial statements.

However, among accountant and CPAs with computers, a silent debate has been brewing over what type of G/L software they should use. DeRespinis, for example, bought a regular Peachtree general ledger rather than a more sophisticated Peachtree client posting from The Micro Computer Store in Norwalk, CT, because, as he explains, "I couldn't see the advantages for more than twice the cost. All most small-business people want anyway are the G/L, a balance sheet and an income statement."

On the other hand, Richard Kohr, a CPA in Ellicott City, MD, chose a very versatile G/L package that comes with an excellent, though fairly expensive, Prodigy computer system. "I did a lot of research on my own and I found that this PROTEGE system was very flexible and could grow," he says, "It custom-

izes reports easily, produces comparison reports for budgets and previous periods, and allowed customized audit trails. Any client can get as much or as little information as he wants, any way he wants it."

While CPAs and accountants will be intensely interested in this debate, small-business people should be, too. After all, they have to pay the bills that help pay for the computer hardware and software.

## Methods of operation

One of the important considerations both accountants and business people should consider is a G/L package's method of operation. There are two basic methods: batch processing and continuous posting. In the former, each transaction is entered into a separate transaction file for temporary storage. At the end of a day, or even a fiscal period—

## Sally Rembold's Road To Success

In 1973, Sally Rembold began her own accounting and bookkeeping service at home. By 1977, her rapidly growing business was getting out of hand. She was frequently late with her clients' books and reports; she worked long hours at night and on weekends to handle her clients' books, but she was slowly losing ground.

Then, she purchased a computer and general ledger accounting software from International Micro Systems, Inc., of Lenexa, KS. Despite ups and downs—the hardware company from which she bought the equipment went out of business—she has more than doubled the size of her business in just three years. And, the work flows

smoothly, her reports to clients go out faster than ever, and she has her weekends and evenings for herself and her family.

### Doubled her practice

"I could not have handled growing from 20 accounts to 45 accounts in just three years without a computer. I also have added word-processing software, so I now offer a broad spectrum of business services, not just accounting," she says.

Rembold's clients are almost all small businesses, at least in terms of employees, if not in dollar value. One of them, an enthusiast and "tinkerer," helped her buy and set up the system. However, Rembold was the

driving force and, although she had no prior computer operating experience ("I'm not a good typist either," she says), she rapidly learned the operations and taught her two assistants how to run it, too.

### Computerized Relief

The most important thing her computer and G/L software have helped her do, she says, is to eliminate errors. "When you post accounts by hand, you can easily make errors—transposing numbers or picking the wrong number out of the wrong account—and it's a slow process," Rembold notes.

But the IMS software lessens the chance of making these errors with automatic

*continued on page 34*





# MEET AXIOM'S IMP — THE ONLY LOW COST IMPACT PRINTER DESIGNED FOR APPLE\* COMPUTERS.

## Three-Way Forms Handling

IMP is equipped with both friction and adjustable tractor feed (2-1/2 to 9-1/2 inches) to provide three-way forms handling — single sheet, roll paper, and fan fold.

## Hardware and Software Compatible

Priced at only \$699, Axiom's versatile IMP-APPLE is the only high quality impact printer specifically designed to operate with the popular APPLE computers. It's completely hardware and software compatible with APPLE. Even comes with cables and connectors for direct plug-in to the computer. No additional interface is needed.

## Enhances HiRes Graphics

IMP greatly enhances HiRes graphics. While other printers can only reproduce graphics on a 1 for 1 basis, IMP provides over 20 different aspect ratios, with complete control over horizontal and vertical resolution, placement, and orientation. For example, a chart could be reduced and printed on one portion of the paper, with text added. IMP also enhances APPLE's alphanumeric capability by providing lower case. It's super simple to operate, too, with all printer commands controlled with a simple key stroke. Another plus, IMP is one of the few printers compatible with PASCAL. How is all this versatility made possible? For one thing, IMP has a 2K byte ROM in its special APPLE interface, while others have 256 bytes or less.

## The Nitty Gritty

IMP prints 80, 96 or 132 columns of crisp hardcopy at a speed of one line per second. The 7x7 dot matrix has a standard 96 ASCII character set. IMP's stylish low profile case will complement APPLE in any home or office. And, in addition to being distinctively styled, IMP is rugged, with a heavy duty mechanism, ribbon cartridge and single snap-out board for easy maintenance.

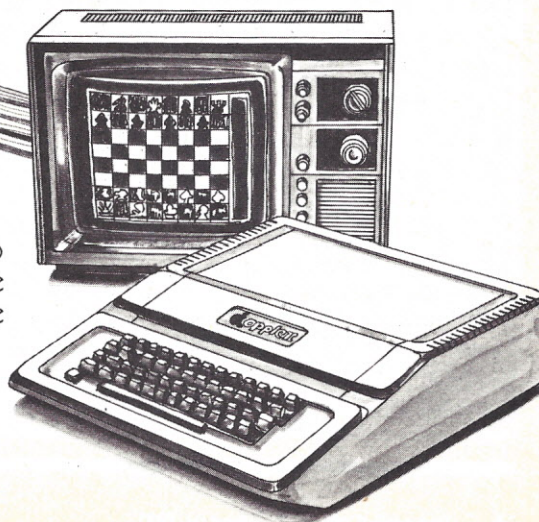
Visit your local computer store to see Axiom's IMP-APPLE in action.

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usually the end of the month—all of the transactions, or a “batch,” are posted to the complete general journal. Thus, all transactions are processed simultaneously. This method derives from the early days of computing, but still has the advantage of leaving more memory space for accounts and transactions; that is, batch-processing-based G/L packages tend to store more accounts and transactions than continuous posting. While batch processing is slow and time-consuming, it usually provides excellent pre-posting editing lists, or lists of transactions that can be checked before final posting. However, if an error is missed during this error-checking, it is difficult to correct after it is posted.

In continuous posting, each transaction is immediately posted to the

correct accounts in the general journal. This eliminates the end-of-period or daily batch processing. Error prevention is simplified by a built-in series of error-checking routines and, usually, account query or inquiry routines. With this method, any transaction or account listing can be called up at random and changed or corrected. The main disadvantage of this method is that these G/Ls have less storage space.

Of the two, the fastest and most popular method is continuous posting; the market clings to the batch-processing method because most of the first wave of G/L packages for micros used that method.

### Common features and reports

With either method, the features that make up a G/L and the reports

a G/L produces remain practically the same, although the term companies use to describe them may differ. For example, three phrases are commonly used to describe profit-and-loss statements: profit-and-loss statements, operating statements, and income statements. Or take transaction listings. In batch-processing systems, they are called “data-entry edit lists.”

Following are brief descriptions of the most important and common features and reports found in G/L software. See the accompanying chart to compare these features and reports for each of the 20 G/L packages reviewed here.

*Chart of Accounts.* This is the basis for any G/L. It is the complete list of account names (or descrip-

*continued on page 74*

## Sally Rembold's Road To Success *continued from page 32*

posting and extensive error-checking routines.

Perhaps as important, Rembold says her clients are much happier because they can get complete monthly reports in a week, instead of two weeks or longer. They get a balance sheet, a profit-and-loss statement, a chart of accounts, cash receipts and cash disbursement journals, and any special reports in a week. “And they have updated information at their fingertips if they need it, such as for a presentation to their bankers.

“My clients are very pleased. I do no advertising,” Rembold says, “and I’ve built the business strictly on referrals. I am more of an accountant than a simple service bureau, and I personally review each client’s reports each month. If anything is out of line, I check it out and correct it, or discuss

it with my client. My computer has enabled me to do a more complete and faster job of review.

“In addition, any client can analyze any financial information he wants with the software’s flexible reports. It’s a very good tool.”

The cost savings have been significant, too. “They are half of what they would be for extra personnel and time if we still had to do hand-posted books,” she says. “Plus, the reports all fit in on 8½-by-11 sheets of paper.”

### Growing and going

Rembold’s system has not remained static as she has grown. She has added a second complete system, put in 32k more RAM into each (because a new customer’s accounts required it) and replaced a slow, converted IBM

printer first with a Centronics and later with an NEC Spinwriter. She got the Spinwriter because “it makes our work look more professional than a dot-matrix printer, and that is worth it to me.”

Spending the extra money for professional-looking reports is one expression of many changes Rembold says she has gone through as her business has grown during the past three years. “I am not the same person I was in 1977. During the past six months, I’ve relocated the business and I finally have enough space to handle all of our work. I have a good street location so we can take advantage of walk-in traffic for word-processing services. Many good things have happened to me, and I would not be where I am at today without my first computer.”



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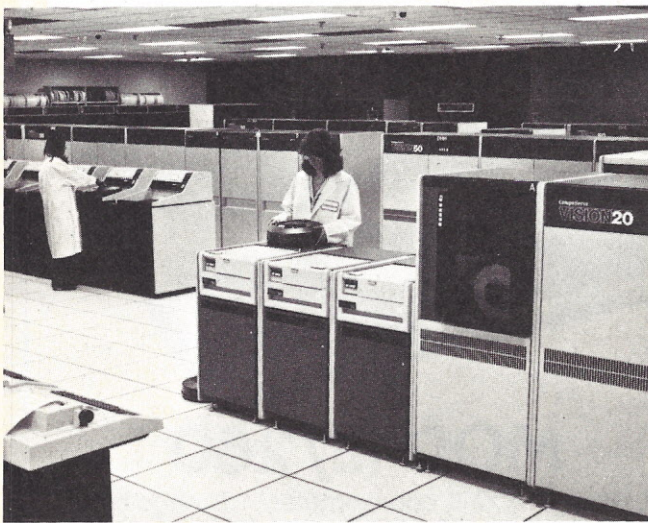


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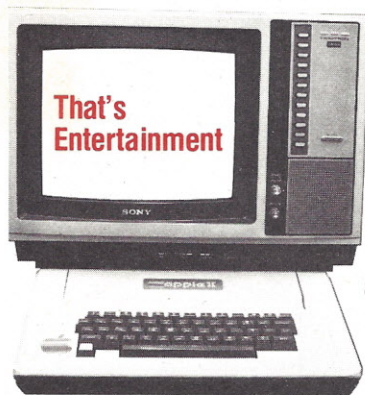
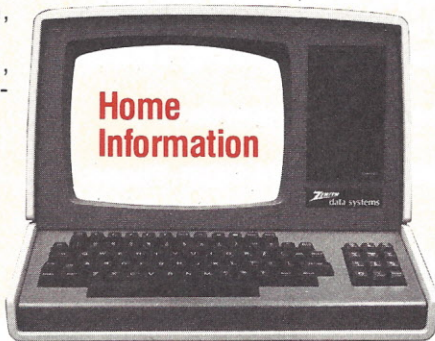


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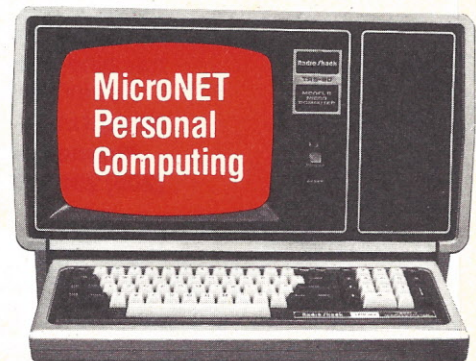


All kinds of games (including some for the kids), book and movie reviews, astrology and the latest sporting event news — even point spreads and injury lists. There's the CompuServe line printer art gallery and even a national user opinion poll for instant feedback on current events.

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While the CompuServe Information Service is designed for everyone, MicroNET Personal Computing is for the knowledgeable computer hobbyist or business person. You can buy software and have it downloaded directly to your person computer. Use programming languages such as APL-SF, EXTENDED BASIC, MACRO-10, SNOBOL, EXTENDED FORTRAN and PASCAL, use word processing and text editing programs.



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## ADVANCED COMPUTING

# The ABCs of VDTs

**As users trade up to more sophisticated computers, they find the machines must be equipped with a separate video display terminal. Here's what's available in VDTs.**

**E**ven if you think you don't need one, it may be only a matter of time before you get a video display terminal (VDT). Their use is growing, and their cost is dropping.

A VDT looks like the video screen on any personal computer. But it offers considerably more versatility. Linked to a computer either directly or by telephone, it is part of an input/output system. The user inputs data and control signals through the VDT keyboard, and the computer responds and outputs data on the VDT screen.

There are "dumb" VDTs and "intelligent" VDTs and all shades of gray in between. Prices range from \$500 for a bare-essentials dumb terminal to \$5000 for an intelligent one with a maximum of functions.

### Growing recognition

Owners of Apple, TRS-80, Pet (CBM), Challenger, Atari and other personal computers that have built-in video-generation circuits and keyboards seldom use a VDT. But when they upgrade to larger computers, they soon learn the advantages of a separate video display terminal.

The development of public computing networks has also created a group of computer users who rely solely on a VDT and a modem. By telephone link, these users tap the

resources of The Source, Micronet and the various public bulletin boards throughout the country. They may also hook into the many educational timesharing systems that are available.

Another group of VDT users is arising from the introduction of multi user and network-operated microcomputer systems. Many schools and businesses are discover-

isfactorily as terminals than small personal computers.

### The basics

The basic VDT contains the following: a cathode-ray tube (CRT) similar to that used in a TV receiver but with higher picture resolution, a keyboard, video generator, character generator and communications circuits.



The VT-100 from Digital Equipment Corporation is a sort-of de-facto standard for video-display terminals.

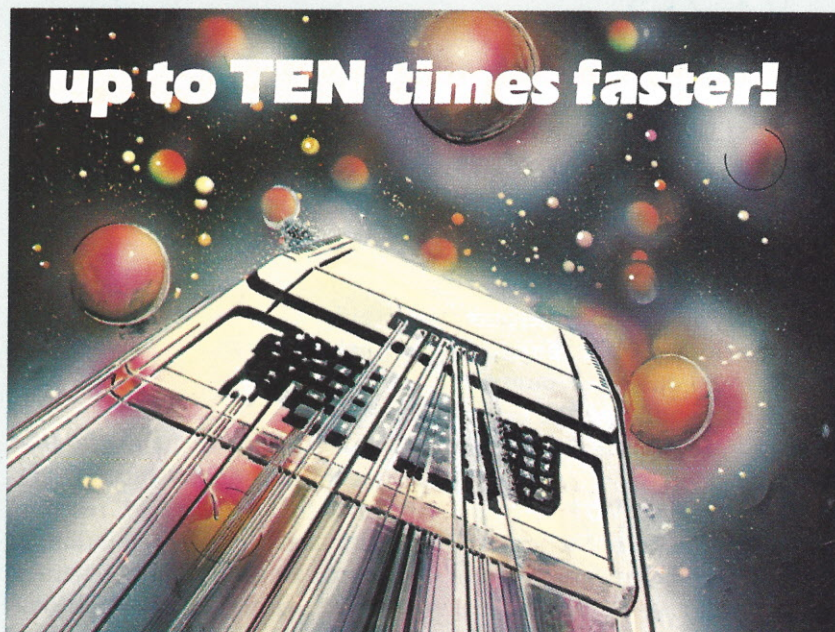
ing that they can buy high-quality VDTs at low cost, connect them to the new networks and thereby share the high cost of computer mass storage. In such a multi user environment, VDTs may perform more sat-

The VDT receives serial data (RS-232-C, in most cases) from a computer either directly or over a telephone line via a modem. The data are either converted to characters by

*continued on page 42*



# Hayden's APPLESOFT™ COMPILER means Speed for your Apple II™ —



**New! APPLESOFT COMPILER** (Eiten) Hayden's Applesoft Compiler will convert standard Applesoft Programs into 6502 machine code binary files, which can be B-Run, from three to ten times faster. It compiles code at user-specified address. Provides a map of the program structure at the end of compilation. **#08809, Apple II Disk, \$200**

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## UTILITY

### LINE & VARIABLE CROSS REFERENCE

**GENERATOR** (Johnson) Provides a cross-reference of line numbers and variable names.

**07301, PET tape, \$16.95**

**APPLESOFT UTILITY PROGRAMS** (Gilder) Increase your BASIC programming speed and flexibility. Contains 9 useful subroutines: 1. REM Writer 2. PRINT Writer 3. POKE Writer 4. Hexadecimal/Decimal Converter 5. Line Counter 6. Renumber 7. Append 8. Byte Counter 9. Slow List/Stop List

**03504, Apple II tape, \$29.95**

**RENUMBER & APPEND: Utility Programs for the Apple** (Gilder) Renumber your Applesoft program and append a second program to the one in memory.

**03804, Apple II tape, \$14.95**

**REVIVE** (Gilder) When a program is accidentally erased, REVIVE searches through memory and finds the information that enables it to restore the pointers that have been changed. **03604, Apple II tape, \$19.95**

**SLOW LIST/STOP LIST: Utility Programs for the Apple** (Gilder) Start, stop, and control the speed of your program with Apple II's game paddles. **03904, Apple II tape, \$10.95**

**PSEUDODISK** (Neuschatz) This money-saving program simulates a disk memory system for Integer BASIC programs. It allows multiple programs in memory at the same time which can be run from a catalog. **04804, APPLE II tape, \$24.95**

**6502 DISASSEMBLER** (Stamm) Produce assembly language source files with labeled subroutines and references from programs already in memory. It is compatible with Hayden's ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM.

**08609, APPLE II Disk, \$39.95**

**DISK CERTIFIER AND COPIER** (Jacc Inc.) A handy utility program that certifies the acceptability of blank diskettes and rejects those with flaws. It also includes a fast machine language disk copying program that will work on single and dual drive systems. **07809, APPLE II Disk, \$19.95**

**DISK CATALOGER** (LeBar) Automatically maintains a cross-reference listing of all your programs, their location by disk number, their function and use. Catalogs, lists and sorts programs. **05203, TRS-80 Level II tape, \$16.95; 05208, TRS-80 Level II Disk, \$21.95**

## BUSINESS

★ ★ **HISTO-GRAPH** (Boyd) A calendar-based histogram or bar-graph production system. Allows the user to enter numeric data that relates to a date, and reproduces that data as a high-resolution histogram. **09009, Apple II Disk, \$29.95**

**FINPLAN: A Financial Planning Program for Small Businesses** (Montgomery) Allows you to enter data from a balance sheet into the program, to make assumptions about the future growth of business, and to have the computer project results for up to a five year period based on those assumptions. And if you change any data, the program revises all resulting data automatically. The disk version can be used only with TRSDOS version 2.3. **05103, TRS-80 Level II tape, \$69.95; 05108, TRS-80 Level II Disk Version, \$74.95**

★ ★ Denotes New Program



**DATA MANAGER: A Data Base Management System and Mailing List** (Lutus) Store information on a floppy disk, and retrieve it quickly and easily by specific names, or by category. **04909, Apple II Disk Version, \$49.95.**

**MAILING LIST** (Tru-Data Software) Lists addresses, prints labels, allows for alterations and deletions, and has the capacity to make duplicate data file disks. Can only be used with version 1.5.  
**05713, Heath Disk \$49.95**

## GAMES

**SARGON II** (Spracklen) The first great computer chess program! "... an excellent program which will provide true challenge for many players... Save your money and buy SARGON II..." '80 Software Critique. **\*03403, TRS-80 Level II; \*03404, Apple II; \*03410, OSI C1P; \*03418, TRS-80; \*03440, OSI C4P; each tape \$29.95. \*03408, TRS-80 Level II Disk; \*03409, Apple II Disk; \*03414, OSI C1P Disk; \*03444, OSI C4P Disk; \*03484, C8P Disk; each disk \$34.95**

**BLACKJACK MASTER: A Simulator/Tutor/Game** (Wazaney) A serious game that performs complex simulations and evaluations of playing and betting strategies. **05303, TRS-80 Level II tape, \$24.95; 05308, TRS-80 Disk Version, \$29.95**

**MICROSAIL** (Johnson) A true test of your nautical skills as you race against wind, tides, and time.  
**04401, PET tape, \$11.95**

**GRIDIRON: A Microfootball Game** (Microflair Associates) Be both offensive and defensive quarterbacks. Includes time-outs, penalties, and the two-point conversion option used in college football.  
**03003, TRS-80 Level II tape, \$12.95**

**MAYDAY** (Breitenbach) Out of fuel! Try to avoid crashing with this challenging airplane flight simulation.  
**02601, PET tape, \$9.95**

**REVERSAL** (Spracklen) Winner of the software division of the **First International Man-Machine OTHELLO™ Tournament**, this version of the 200-year old game Reversi, features 27 levels of play and high-resolution color graphics. **07004, APPLE II tape, \$29.95; 07009, APPLE II Disk, \$34.95**

**STARCLASH** (Walton) An exciting game of galactic strategy for one or two players.  
**05903, TRS-80 Level II tape, \$16.95**

**ROYAL FLUSH: Competitive Poker Solitaire** (Wazaney) A game you can play alone or with any number of players. High score wins in this poker-based, fun-filled card game. Choose from possible game variations. **07101, PET; 07103, TRS-80 Level II, each tape, \$14.95**

**BACKGAMMON** (Wazaney) A classic game of skill and luck played against a preprogrammed opponent. **02501, PET; 02503, TRS-80 Level II; each tape, \$10.95**

**BATTER UP!!: A Microbaseball Game** (Savon) Action-packed baseball with 3 levels of play. **02801, PET; 02803, TRS-80 Level II; each tape, \$10.95**

## LANGUAGE

**PROGRAMMING IN APPLE™ INTEGER BASIC: Self-Teaching Software** (Banks & Coan) Teach yourself Apple Integer BASIC and control your own progress at all times with this interactive programmed instruction format. **05004, Apple II, tape, \$29.95; 05009, Apple II Disk Version, \$39.95**

**APPLE™ ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM: An Assembler/Editor/Formatter** (Lutus) Write and modify your machine language programs quickly and easily. **04609, Apple II Disk Version, \$39.95.**

**SUPER APPLE™ BASIC** (Lutus) A structured BASIC that compiles into an optimized Applesoft or Integer BASIC program. **05409, Apple II Disk, \$39.95**

**Super FORTH** (Bugbee) This is a fast, high-level, expandable language that features integer and floating-point math, high-resolution graphics and string handling capability. **05509, APPLE II Disk, \$49.95**

## ENGINEERING

**★ ★ OP-AMP DESIGN** (Gabrielson) Provides the necessary values for your design and will suggest appropriate op-amp types. Includes a choice of six op-amps, and the program will then determine if your selection of an op-amp will be acceptable within your chosen parameters. Can be updated to accommodate future op-amps. **09704, Apple II tape, \$16.95**

**★ ★ DOUBLE PRECISION FLOATING POINT FOR APPLESOFT™** (S-C Software) Extends the accuracy of the arithmetic available on the Apple from nine digits to a full 21-digit precision on all functions in Applesoft compatible format. **09409, Apple II Disk, \$49.95**

**MCAP: A Microcomputer Circuit Analysis Program** (Savon) Performs a linear voltage, impedance, or transfer impedance analysis of an electronic circuit. **04501, PET; 04503, TRS-80 Level II; 04504, Apple II; each tape \$24.95; 04513, Heathkit/Zenith Disk, \$29.95**

**ENGINEERING MATHEMATICS-1** (Gilder) Contains eight programs useful to the engineer: 1. Solving Simultaneous Equations 2. Evaluation of a Polynomial 3. Quadratic Equations 4. Integration by Simpson's Rule 5. Newton-Raphson Roots 6. Derivative of a Function 7. Factorial of a Given Number 8. Extended Factorial Calculation. **01301, PET; 01303, TRS-80 Level II; 01304, Apple II; each tape \$14.95**

**MICROCOMPUTER AIDED DESIGN OF ACTIVE FILTERS** (Gilder) Eight programs that simplify the design of active filters and will calculate the component values needed for various bandpass, low-pass, and notch-type filters. **01401, PET; 01403, TRS-80 Level II; 01404, Apple II; 01407, Heath; each tape \$16.95; 01413, Heathkit/Zenith Disk Version, \$21.95**

## EDUCATION

**CROSSBOW** (Breitenbach) Features a target game that, besides offering hours of fun, teaches fractions in an exciting and competitive environment. An educational program for all ages. **02701, PET tape, \$9.95**

**GENERAL MATHEMATICS-1** (Gilder) Contains 15 programs useful to anyone who wants to improve their math skills and accelerate their computation. The fifteen programs are: 1. Log to Any Base 2. New Coordinates 3. Rectangular/Polar Coordinates 4. Permutations 5. Combinations 6. Vector Cross-Products 7. Vector Scalar Products 8. Max/Min Locator 9. Number Rounder 10. Dimension Scaler 11. Histogram 12. Circle Finder 13. Nth Root of a Number 14. Normally Distributed Random Numbers 15. Rational Fractions. **01101, PET; 01103, TRS-80 Level II; 01104, Apple II; 01105, Sorcerer; each tape \$14.95**

**COMPLEX MATHEMATICS** (Gilder) Contains 8 programs that give the user the ability to perform computations of complex numbers in BASIC rather than in FORTRAN. The eight programs are: 1. Absolute Value 2. Complex Subtraction 4. Complex Multiplication 5. Complex Division 6. Nth Roots of a Complex Number 7. Complex Exponential 8. Complex Number to a Real Power. **01201, PET; 01203, TRS-80 Level II; 01204, Apple II; each tape \$14.95**

## AT HOME

**ENERGY MISER** (SuperSoft Associates) A complete heating/cooling analysis program for your home or office that will calculate heat loss or gain due to poor insulation, leaky doors and windows, and more. **05601 PET; 05603, TRS-80 Level II; each tape \$29.95; 05609, Apple II Disk Version; 05613, Heathkit/Zenith Disk Version; \$29.95**

**PERSONAL PROPERTY INVENTORY** (Southern Systems) Here's an easy-to-use program that lets you develop, maintain, sort and save an inventory of your personal property.  
**08903, TRS-80 Level II tape, \$14.95**

## GENERAL INTEREST

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the character generator or interpreted as control signals (such as "carriage return"). Characters are painted on the CRT by the video circuits.

The keyboard is a separate assembly. When a key is pressed, it generates the ASCII code for that character or control signal. The resulting data signal is transmitted to the computer as input data.



This terminal from RCA is a "tubeless" terminal. It connects to an external display.

## How it works

VDTs offer a choice of modes in operation. In the local mode, the character is shown on the CRT. If the VDT is in the transmit mode, it sends the data to the computer.

If the mode switch is set to FULL DUPLEX, the signal is first transmitted to the computer, which then echoes it back to the VDT, where it is shown on the screen. If the same switch is set to HALF DUPLEX, the signal is first shown on the screen directly from the keyboard and then sent to the computer; in this case there is no visual evidence that the character code sent by the VDT was received by the computer.

The communications circuits also have switches for setting the speed of data transfer between the VDT and the computer. These usually provide for baud (bits per second) rates ranging from 110 to 9600 baud.

Other basic switches may include these:

- **Parity**—Many large computers found on timesharing systems check to see if one bit of the received data signal is a one or a zero. This is called parity checking. They do this to be sure the character received at the computer is the one sent from the terminal. (If one bit is changed by line noise, the character is changed.)

Some systems require a "1" parity bit, some require a "0" parity bit, and some, like personal computers, use a "no" parity. Parity is set by a group of switches on the VDT.

- **Inverse video**—These switches change the display from white characters against a black background to black characters against white background.

- **Blinking cursor**—The cursor can be set to blink or not to blink by setting this switch.

- **Upper/lowercase**—Some terminals have switches to permit characters to be received and sent in uppercase only. This matches the printout of Teletype machines.

## Dumb terminals

Dumb VDTs function exactly the way a teletypewriter does, and, in fact, first-generation personal computers used Teletypes as both ter-

minals and data-storage devices. They were slow and relatively expensive. One of the first computer kits offered to hobbyists was the TV Typewriter, from Southwest Technical Products.

With the addition of communication circuits and memory to the CT1024 kit, the TV Typewriter became the first low-cost video terminal for personal computers.

VDTs—or "glass Teletypes," as they were then often called—were expensive. Good ones were hard to find on the used market. However, in 1976 ITT sold many excellent video terminals used by its discontinued Data Services Division. These were called ITT ASCII SCOPES, and hobbyists and students bought them for \$500 to \$700. Many are still in use.

Lear Seigler, a major manufacturer of VDTs, was about to market a new low-cost one when John French, owner of The Computer Mart of Los Angeles, convinced the company to produce a kit of its new unit so users of personal computers could afford it. This unit became widely known as the ADM-3A, The Dumb Terminal.

## Intelligent terminals

Intelligent VDTs, by contrast, have versatile features that can be set from the keyboard or by program control from the computer. They include these internal editing features: inserting, deleting or moving characters or blocks of characters, vertical and horizontal scrolling, CLEAR TO END OF LINE and CLEAR TO END OF SCREEN instructions, character inversion (white/black), alternate character sets, and many other functions.

These terminals also provide for protected fields of characters, which cannot be changed from the keyboard, so that a form outline can be programmed on the screen and the operator need only type in the



designated spaces. In addition more intelligent terminals can display complicated graphics. And in some cases provision is made to split the screen to allow for multiple displays.

### Disappearing chips

Most VDTs built before 1978 contained hundreds of small integrated circuits, often mounted on several circuit boards. In 1978, microprocessors became so inexpensive that it was possible to use them to eliminate many chips.

The Hazeltine 1500 was one of the first VDTs to use an 8080 microprocessor, ROM and RAM and a bus system, all mounted on a single board. It is, in fact, a video computer. To produce the more advanced models of this series (1510, 1520), the company merely added



The ADM-3A Dumb Terminal from Lear Siegler Data Products Division recently attained the ability to have voice-actuated input.

keys, more RAM and different ROM programs.

The VDTs of the 1980s have less than half the chips that were needed for the VDTs of the 1970s, and they use only half the power. Nevertheless they often have more features. Large-scale integration reduced the

cost of VDTs by at least 30 percent.

So much for the general characteristics of VDTs. The real question for personal computer users is: What characteristics should be considered in the selection of a VDT? There are two essential ones:

- *A good keyboard.* It should feel good to use, and it must not "bounce" and transmit erroneous characters. You will not find wayward characters easily in a long program or text. You will spend long hours looking for the errors in your program.

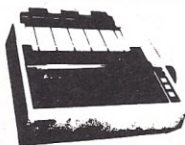
Keys that stick are just as bad and will also cause errors. When your fingers strike the keyboard, the keys should not "wobble," or be slow to return to position. Ask someone who has used the terminal for a long time if he likes the keyboard. It is the

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part that breaks down first, and if the keyboard needs repair, the VDT is useless.

- *A clear, sharp CRT display.* The screen should have controls to adjust contrast and brightness. The characters should be sharp and clear at the brightness level that is comfortable for you. The display should not flicker when a key is struck.

You should be able to change the display from normal to inverse video. The resolution should be good enough so there is no unwanted separation of the dots at the screen size you prefer.

The standard screen size seems to be 12 inches, with an 80-character by 24-line display. This is enough for text-page length or a long program listing. An 82-character, 66-line screen is nice but is usually not worth the extra cost.

Linearity is very important. The characters at the top and bottom of the display should be the same size as the characters at the center of the

screen or the operator will get tired quickly. And the VDT should present the display at a comfortable distance from the eyes or eyestrain will result.

## Important extras

Here are important features that a VDT should have and that are worth considering paying extra for:

- *Numerical keypad*—If you do considerable numeric data entry, this is really worthwhile.
- *Directional arrows for cursor control*—You need to move the cursor so much during editing and programming that you shouldn't consider a VDT without this.
- *Repeat key*—Some VDTs offer the repeat function on every key; the user merely keeps the key depressed. Others have a special repeat key. Either method has advantages, but some kind of repeat function is essential.
- *Shift Lock*—You really need this.
- *Home cursor and clear screen*

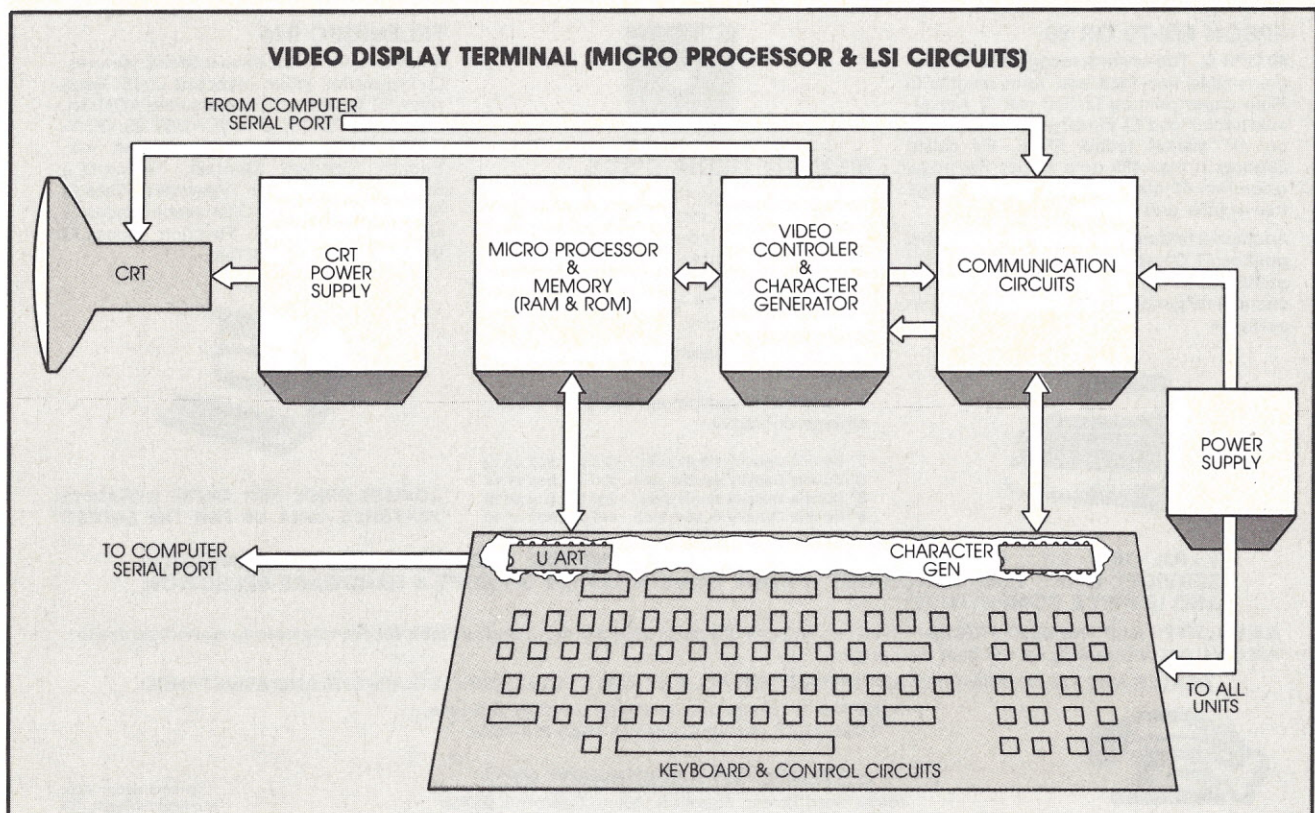
*keys*—These are not always offered, but they are often needed. You can accomplish the same thing by



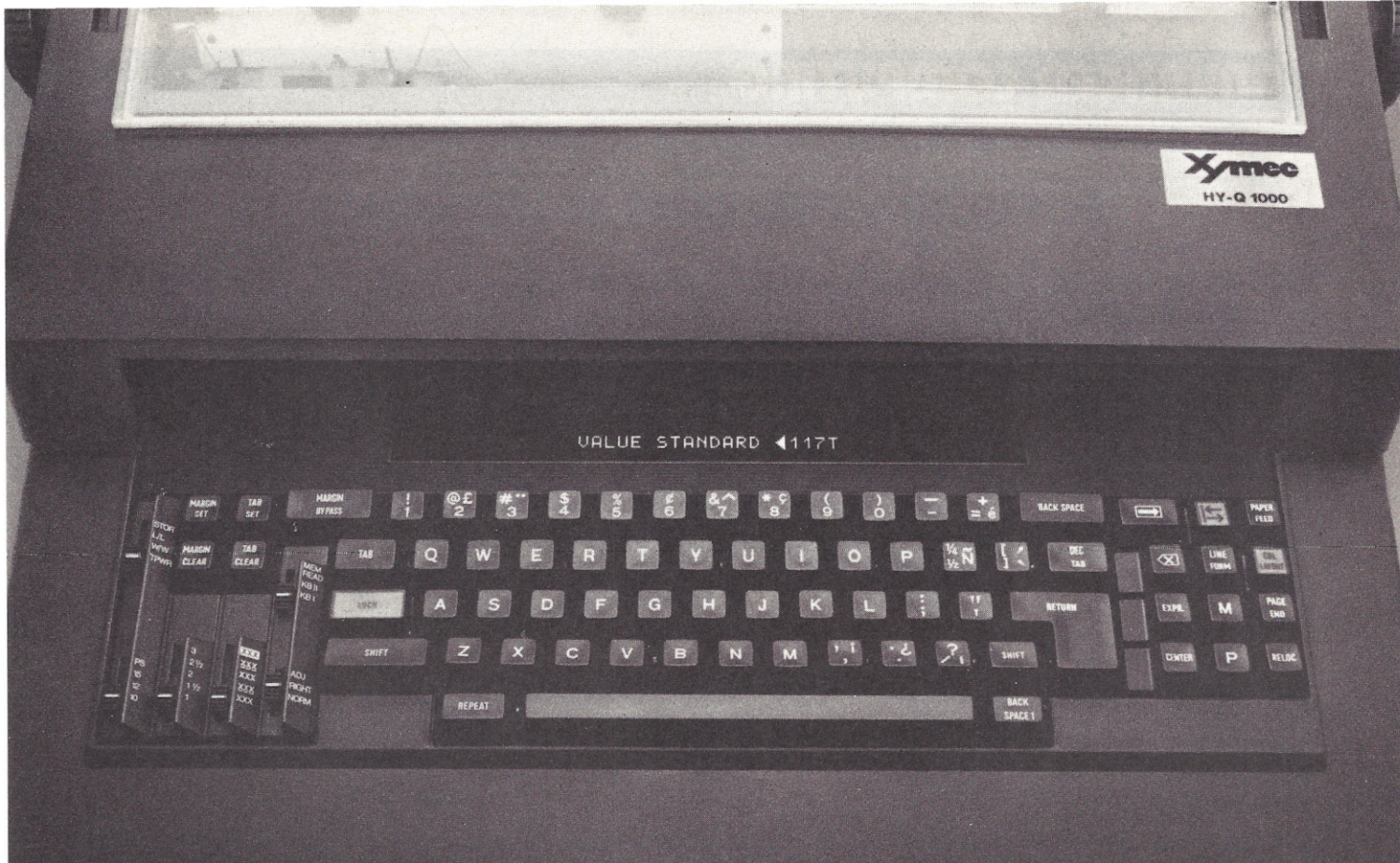
Applied Digital Data Systems has broken through the low-price barrier with the Viewpoint terminal that sells for less than \$500 in large quantities.

CTL/KEY sequences, but it takes time and thought.

- *Escape key*—Don't buy a VDT without one. Some terminals offer only a CTL (control) key, but many







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Ann Arbor Terminals Inc. 6175 Jackson Rd. Ann Arbor, MI 48103 (313) 663-8000	Ambassador II	15" Screen, Sophisticated block move and Edit Terminals. Include five graphic renditions	\$995-1100
Applied Digital Data Systems, Inc. (ADDS) 100 Marcus Blvd. Hauppauge, NY 11787 (516) 231-5400	(New) ADDS Viewpoint	Detachable Keyboard-2 Position Screen, Small Size, Typewriter Keyboard, Mod. "B" has Glare Filter	\$650
	ADDS Regent 20	Low Cost.	\$900
Beehive International 4910 Amelia Earhart Dr. Salt Lake City, UT 84125 (801) 355-6000	DM-5	Detached Keyboard, Edit Functions, Memory Lock, Split Screen, Block-move, Non-glare CRT Line Drawing	\$880
C. Itoh Electronics 5301 Beethoven St. Los Angeles, CA 90066 (213) 306-6700	CIT-101	Plug Compatible with DEC VT-100-132 or 80 Characters, Single or Double-width, or height characters, Non-glare screen detached keyboard	\$1995
Digital Equipment Corp. Manard, MA 01454 (617) 897-5111	VT-100	Line Draw Graphics, 132" Column Terminal or 80 Column Detached Keyboard Split Screen	\$950-1000
General Terminal Corp. 14831 Franklin Tustin, CA 92680 (714) 730-0123	GT-100 Series Some Models Emulate DEC, ADDS & Data General Terminals	User Programmable function keys, Exit Functions, Numeric Pad, 32 Character Linedraw	\$950-1400
Hazeltine Corporation Commack, NY 11725 (516) 462-5100	New! Esprit	Advanced Intel. Terminal	\$995
	1410	Numeric Keypad, High Resolution CRT, Cursor Addressing	\$900
	1500	High Resolution CRT	\$1225
Intertec Data Systems 2300 Broad Ave. Columbia, SC 29210 (803) 798-9100	Interube III	Z80 Based Keypad. Function Keys Same as	\$895
	Emulator	Interube, Except Emulates ADDS, Haz. Soroc, other CRTS	\$895
Lear Siegler 714 North Broadhurst Anaheim, CA 92803 (714) 774-1010	ADM-3A	Low Cost, Teletype Compatible, 12" Screen 80 x 24 Aux. Keypad, RE-232C or 20 mA Upper-case Std.	\$850-950
RCA Microcomputer Marketing New Holland Pike Lancaster, PA 17604 (717) 397-7661	VP3301 (Keyboard Only)	Either 20 x 40 Characters or RS-232C, or 20mA-Color Graphics Resident or Programmable Character Attaches to Monitor or T.V. Set	\$369-469
Soroc Technology 165 Freedom Ave. Anaheim, CA 92803 (714) 992-2860	IQ 120	Upper/Lowercase 80 x 25 Screen Advanced Model, Functions, Editing Z80 Based Software, Programmable Detached Keyboard and Extended Memory	\$700-995
	IQ 140		\$1150-1495
	IQ 135		\$850
	IQ 150		
Southwest Technical Products Corporation 219 West Rhapsody San Antonio, TX 78205 (512) 344-0241	8209 (9" CRT)	Intelligent Terminal 82 x 24 or 82 x 20 Screen Format, Internal Editing, Printer Port, Numeric Pad, Protected Fields	\$945
Synertek Systems Corp. 150 S. Wolfe Rd. Sunnyvale, CA 94086 (408) 988-5689	KTM-3 KTM-3/80 (Keyboard Only)	Upper/Lowercase, 24 x 80 Characters or 24 x 40 Characters Scrolling, Full Cursor Control, Clear to End of Screen or Clear to End of Line Auto-Key Repeat Can be used with Monitor or T.V. Set.	\$389 (plus options)
Televideo Systems Inc. 117 Morse Ave. Sunnyvale, CA 94086 (408) 745-7760	990	10 Function Codes, Erase, End of Line, Erase, End of Page, Emulates ADM-3A, ADM-5A, Haz. 1410 or Viewpoint.	\$699



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MANUFACTURER	MODEL	TYPE	PRICE	USE	FEATURES
Advanced Logic Systems 1026 W. Maude Ave. Suite 305 Sunnyvale, CA 94086	Smart term	Memory-mapped	\$300-325	Apple II Plus	80 character x 24 lines of video for Apple II. Upper/lowercase
Bit 3 Computer Corp. 1890 Huron St. St. Paul, MN 55113	Full-View 80	Memory-mapped video	\$395	Apple II	80 column, or 40 column graphics on single monitor via keyboard of program control.
Computer Stop 16919 Hawthorne Blvd. Lawndale, CA 90260	Doublevision 80 x 24	Memory-mapped	\$295	Apple II	80 characters by 24 lines, upper/lowercase characters, 96-character ASCII set.
Cromemco Inc. 280 Bernarado Mt. View, CA 94042	TV Dazzler	Color Graphics Board	\$395	S-100 computers	Formats each memory bit using direct memory access to a dot on color screen. Gives 128 x 128 element picture.
	SD1-High Resolution Color graphics interface	High-Res graphics interface	\$795	S-100 computers	754 by 482 point resolution, color or B/W. Any 16 colors or 4096 can be used. Requires 48k memory and R.G.B. monitor.
Godbout Electronics Box 2355 Oakland Airport Oakland, CA 94614	Spectrum color-graphics board	Memory-mapped video	\$399-499	S-100 computers	Parallel I/O port; 8k static RAM; configurable for 2 colors plus alphanumeric display with 32 x 16 display or 8 color semi graphics with a 64 x 32 display.
Jade Computer Products 4901 W. Rosencrans Hawthorne, CA 90250	10B-1050A	Memory-mapped video	\$125	S-100 bus computers	64 characters by 16 lines. Upper/lowercase. 7 x 9 matrix.
J.E.S. Graphics Box 2752 Tulsa, OK 74101	Super Compuprism	Memory-mapped video	\$280	S-100 computers	288 x 192 pixels for total of 55,296. Each dot programmable for 16 colors or gray shades. Has 32k of on-board RAM.
M & R Enterprises P.O. Box 61011 Sunnyvale, CA 94088	Sup-R-Term	Memory-mapped	\$300-350	Apple II	80 column by 24 lines, upper/lowercase. Works with low cost monitor, shift lock. 3k bytes ROM.
Scion Corp. 8455-D Tyco Rd. Vienna, VA 22180	Micro-Angelo	High-Res Graphics Single Board Computer	\$2495 (system) \$1095 (board)	S-100 computers	Has Z80 microprocessor. 32k RAM, 4k ROM. Emulates a 85 character by 40 line graphics terminal with high-resolution graphics. Both B/W and color option available.
SD Systems P.O. Box 28810 Dallas, TX 75228	VOB-8024	I/O mapped video	\$400	S-100 bus computers	80 characters by 24 lines. Upper/lowercase. 7 x 9 matrix, reverse video, blinking, has parallel I/O for keyboard.
SSM Microcomputer Products 2190 Paragon Dr. San Jose, CA 95131	VB1B	Memory-mapped video	\$165-195	S-100 bus computers	64 or 32 characters per line, graphics 128 x 48 matrix, upper/lowercase characters.
VIDEX 897 N.W. Grant Ave. Corvallis, OR 97330	Videoterm	Memory-mapped	\$345 (options extra)	Apple II	80 character by 24 lines, upper/lowercase 7 x 9 dot matrix. Lowercase characters have descenders. Inverse video option, alternate character set option with PROMs.

functions require escape keys.

- **Two CTRL keys**—One on each side of the keyboard is a helpful arrangement.
- **A large Return (CR) key**—Size is important so you don't miss it with your finger. Some VDTs label this feature New Line, but it is still the carriage return key that tells the

computer that you are finished with data entry.

- **External screen brightness control**—Handy to have, but be sure it's handy. Some VDTs have this control inside the case where you can't get at it easily.
- **Broad range of baud rates**—You want this because you will need the

high speed sooner or later.

Some additional features often found on VDTs are a detachable keyboard, printer port, green screen and external video connection.

In addition some VDTs have extra keys to which special control functions can be assigned. For example, Insert Character is a two-key func-



# ADVANCED COMPUTING

tion in most word processing systems (often CTRL/F). In a VDT equipped with special-function keys, the user can assign this function to one key and save a keystroke every time insertions are made. This option is usually found on the higher-priced models and is not essential.

## The elusive "standard"

By now you may have gathered that there is no "standard" keyboard arrangement. Originally many manufacturers used the Teletype keyboard arrangement, since they were building "glass teletypes." But the Teletype keyboard is limited and really unsuited for video, so many manufacturers have changed it.

All VDT keyboards, however, are

equipped with QWERTY key arrangements (the characters on the top left of the standard typewriter keyboard). The cursor-control keys,



Teletype's 910 terminal achieves its low price partly through sub assembly in Korea. Design, engineering and final assembly are done in the United States.

however, vary from machine to machine.

We turn now to variations on the VDT—cost-cutting terminal equipment with limited functions.

## VDTs without CRTs

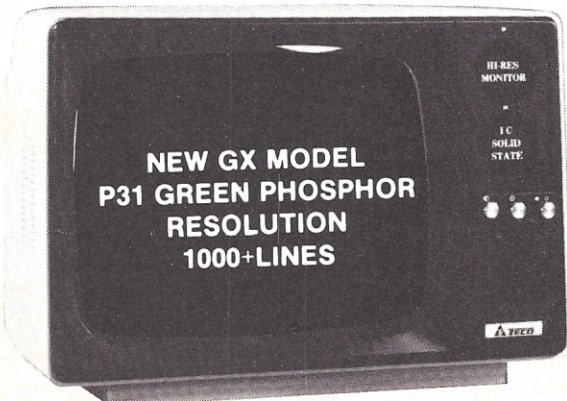
How about "tubeless terminals"? Several manufacturers offer these at very low cost. They permit users to enjoy the latest technology in terminals without paying for the CRT. A TV screen may be used, or a video monitor that the user already has can be connected.

The Synertek KTM-3, for example, is a keyboard module that uses the latest LSI technology with two microprocessors to provide a video terminal without the CRT. Many of the most desirable keyboard features

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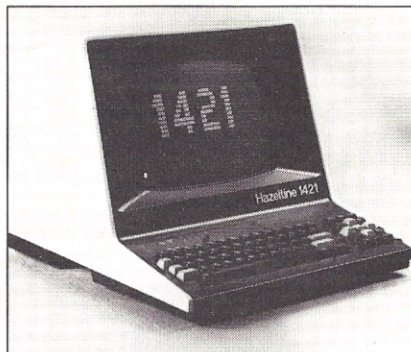


already described are incorporated in the keyboard. There is a choice of two screen sizes: 24 lines, 40 characters wide for use with an RF modulator connecting to a standard TV screen, or 24 lines, 80 characters wide for use with a standard video monitor.

Another tubeless terminal is the VP-3300 Series from RCA. It contains a portable text, graphics and color terminal with a flexible-membrane keyboard. Included are 128 ASCII characters or any type of

redefinable character set under software control.

The video can be reversed under software control, and individual characters and background can each be displayed in one of eight software-selectable colors. The series in-



Hazeltine's 1421 terminal is a member of the 1400 series. It has fewer features than does the company's higher-priced 1500 Series.

cludes a built-in RF modulator for connection to a color TV set, although a monitor can also be used. Many people are connecting this unit to an extra serial port just to use the graphics.

Yet another tubeless unit is the ASCII Keyboard Terminal kit offered by Netronics R&D. With a 128-character set and full cursor control, it can be used for RS-232-C data input. It has selectable baud rates, and the display is either 32 or 64 characters by 16 lines.

The unit can be connected to a TV set through an RF modulator or to a video monitor. It represents in kit form one of the cheapest ways of getting a new VDT.

### Video display boards

Many personal-computer owners want to own a computer with an expansion bus but can't afford the necessary VDT. One solution has been to buy a video display board that plugs into the bus. For owners of S-100, SS-50 or OSI-48 bus machines, the use of such a board

may have other advantages over a VDT. There are features such as color and graphics, programmable alternate character sets and extra-high resolution.

For owners of Apple II computers, a video display board offers the use of an 80-character screen in place of the 40-character standard with the Apple II. One other feature that is obtainable only through the use of plug-in video display boards is memory-mapped video. With this, the video display represents a section of the computer memory, and changes made on the screen, such as text editing, are direct modifications of the computer memory.

This is an advantage in word processing systems and a necessity for video graphics. On the other hand, it can be a disadvantage because a fixed portion of the computer memory must be devoted to the video display.

To obtain really high-resolution graphics with a computer requires that the video display use a very large amount of memory. The same is true with video boards deriving their input from a video camera. These boards are, in effect, single-board computers with high-resolution graphics. Some provide for memory management to allow even more graphics memory space.

The Microangelo from Scion is typical of plug-in graphics computers. The SDI board set from Cromemco provides similar capability but is an interface rather than a graphics computer.

### Video combinations

VDTs obtain their video information from the computer's serial-data stream through connection to an I/O port and video-display boards plugged into the computer bus. There is also a type of terminal that is a combination of both methods.

*continued on page 120*

### Controlling special functions

Many of the special functions of the VDT are controlled by pressing combinations of the CONTROL key and other keys on the keyboard. Other functions use combinations of the ESCAPE and other keys. Some of these special functions, not used on all VDTs, are as follows:

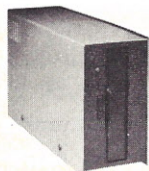
- Character Delete
- Line Delete
- Clear Screen
- Clear to End of Screen
- Cursor Home (top of screen)
- Cursor Up
- Cursor Down
- Cursor Right
- Cursor Left

It is not enough to have these functions set by switches on the VDT. To be useful, they must also be settable by transmission of the correct code from the computer as a statement within a program. So you must become familiar with the control codes for the features on the terminal. You should also examine your software to determine if the control codes used in the program are compatible with those used on your new VDT.



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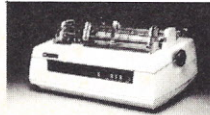
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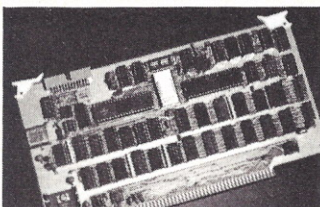
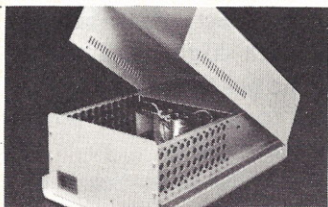
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CIRCLE 21





## ADVANCED COMPUTING

# Software-Protection Schemes: How They Work

**Before you lose your marbles, learn the basics of software protection.**

**T**here's the dog barking, must be the mailman. Dashing from the cereal bowl to the door you wonder if it's arrived. Frantically you sort through the heap of junk mail in hopes of seeing that familiar manila envelope. A patch of brown catches your eye. A stamped title across the envelope reads: "Elephant's Tooth Software Co." . . . That's it!

Casting aside the rest of the mail, you make a beeline for your computer room, ripping the envelope as you go. Anticipation pulses through to your fingertips. You power up the system and read the instructions far enough to learn the file name. And you're off: SYSTEM (enter) and then \*? SPACE MARBLES. Jam the cassette into the recorder and press PLAY. What? It's not loading? Press (ENTER) again.

You proceed to read the instructions. Seems to be taking a long time to load. Must be a good program. Glancing at the video you see a flurry of activity that soon clears, and then a message is printed mid-screen: "GAME OVER—WANT TO TRY AGAIN?"

"What do you mean 'TRY AGAIN?'" you exclaim. "I never tried it the first time! Wonder how it got running, anyway. I don't remember initializing it. Oh well, it

loaded so I better make a backup copy."

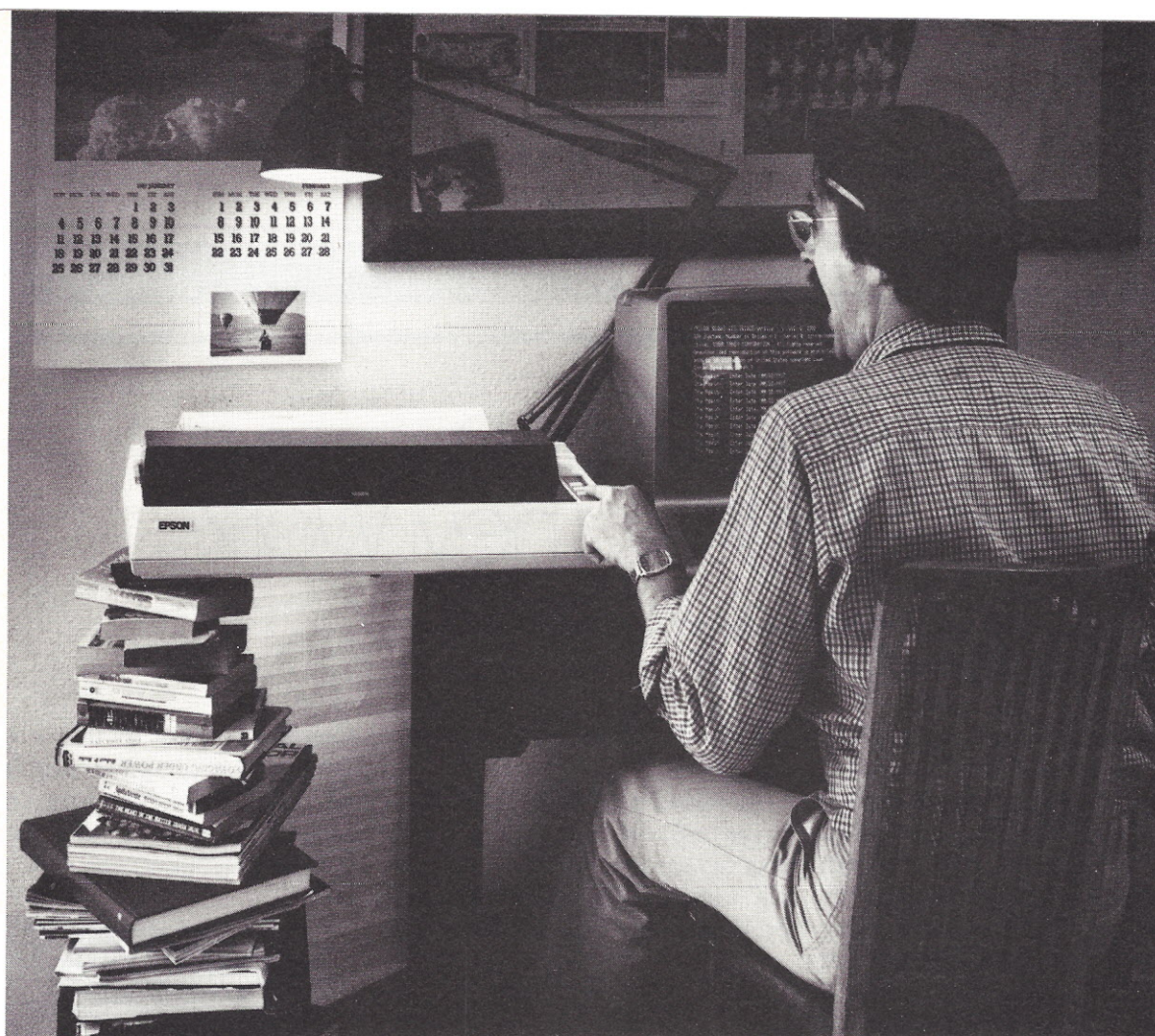
Rummaging through the drawers in the desk you search for an empty disk or tape to store it on. Then it's out with the "BIT BYTER" copy program. The RESET button is

pressed to return to Basic. Wait a minute, the computer just locked up. Odd. What the heck, power down, power up, load in BIT BYTER and insert the tape to be



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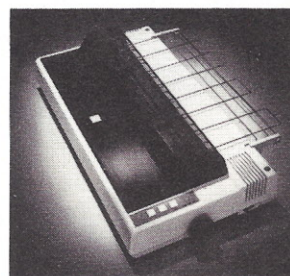
The MX-100 is a printer that must be seen to be believed. For starters, we built in unmatched correspondence quality printing, and an ultra-high resolution bit image graphics capability. Then we added the ability to print up to 233 columns of information on 15" wide paper to give you the most incredible spread sheets you're ever likely to see. Finally, we topped it all off with *both* a satin-smooth friction feed platen *and* fully adjustable, removable tractors. And the list of standard features goes on and on and on.

Needless to say, the specs on this machine — and especially at under \$1000 — are practically unbelievable. But there's something about the MX-100 that goes far

beyond just the specs; something about the way it all comes together, the attention to detail, the fit, the feel. Mere words fail us. But when you see an MX-100, you'll know what we mean.

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**CIRCLE 22**



Table I

Address Decimal	(Hex)	Byte (Hex)	ASCII	Description
17129	42E9	00		LSB next line pointer
17130	42EA	43		MSB next line pointer
17131	42EB	0A		LSB line number (10)
17132	42EC	00		MSB line number
17133	42ED	B2		PRINT token byte
17134	42EE	22	"	first quote byte
17135	42EF	54	T	letter T
17136	42F0	45	E	letter E
17137	42F1	53	S	letter S
17138	42F2	54	T	letter T
17139	42F3	20		SPACE byte
17140	42F4	4C	L	letter L
17141	42F5	49	I	letter I
17142	42F6	4E	N	letter N
17143	42F7	45	E	letter E
17144	42F8	22	"	last quote byte
17145	42F9	3A	:	colon (line delimiter)
17146	42FA	93		REM token byte
17147	42FB	20		SPACE byte
17148	42FC	23	#	first # sign
17149	42FD	23	#	second # sign
17150	42FE	23	#	last # sign
17151	42FF	00		end of line byte

Results from PEEKing memory 17129 to 17151 (42E9 to 42FF Hex).

copied. Press (ENTER) to copy and away it goes. Sort of. For some cryptic reason the tape refuses to be *copied*. Alarmed, you try all of your other copying programs, all to no avail. The tape just sits there and defies copying. What to do now? It's back to the now soggy bowl of cereal—maybe the answer is in your Alphabits. Why did that tape self-initialize? Before you lose your marbles trying to answer these questions, you'd better learn the basics about software protection.

## Protection styles

Machine-language programs are the easiest type to protect, mainly because you have no control over them. With Basic you can list the program, which helps somewhat. But with machine language you are

at the mercy of the computer.

Protected machine-language programs have a loader program, sometimes called a "header." When you enter the filename using the (SYSTEM) command this header is loaded in. Now one of two things will occur: the header will override the ROM load routine and load in the rest of the program itself (If this is the case the program will also be executed upon completion of loading.), or the program will stop and allow you to input the filename of the program or to enter a / followed by (ENTER).

Basic is protected a little differently. There are ways (to be discussed later) of hiding lines within your program. These lines will not list on the video display but will usually list on a printer.

## Machine language loaders

How does the ROM routine become overridden? When you start to load a routine all of the work is done in ROM. As the program loads, the ROM checks for CHECKSUMS and an end byte. When the ROM finds an end byte it leaves the ROM area via a machine language call to the RAM address 41E2H (16866 in decimal). Why does it do that? You are curious aren't you?

Believe it or not the ROM is checking to see if a disk operating system is in memory. If you have a cassette system the byte at 41E2H is C9H (201 in decimal) or a RET(urn) byte. And it goes back to the ROM for the second \*? prompt. By having a disk on line this byte is changed to a JUMP to somewhere in your DOS.

Some programs will even go so far as to make you power down before you can exit the program. Again, this is simply done by loading up 4007H and 4008H with an LSB/MSB address. Now when the RESET button is pressed the program will automatically jump to the address specified. Normally these locations hold a ROM address. These locations can only be redefined from machine language. Doing so from Basic will usually result in a familiar slogan appearing in the top left corner (MEMORY SIZE?). Any time MEMORY SIZE? is encountered these bytes are reloaded with their proper values. As you can see, you have little control over the system.

## Hiding lines in BASIC

This is a nice little routine to have in your software. It requires that you be able to see (by using PEEK or some other form of ASCII dump) the bytes of your program in memory. For our examples we will use the following single line of BASIC: 10 PRINT "LINE TEST":REM ###

There are actually two similar



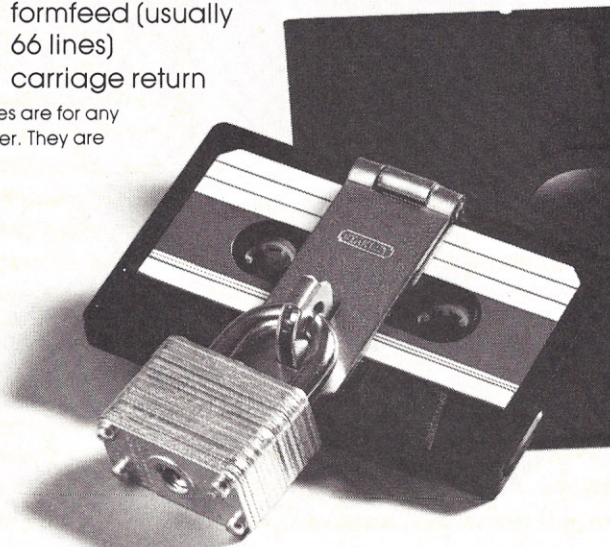
Table 2

Address	Poke	Results
Location	Value	
17150	8	will delete the last # sign from listing
17150	23	change to 32 character mode on video
17150	24	backspace cursor
17150	25	advance cursor
17150	26	downward linefeed on video
17150	27	upward linefeed on video (SHIFT UP ARROW)
17150	28	home the cursor
17150	29	will not appear to work (it does this one normally)
17150	30	erase to end of line. Not useful.
17150	31	erase to end of frame

Table 3

Address	Poke	Result
Location	Value	
17150	10	linefeed with a carriage return
17150	11	formfeed (not always 66 lines)
17150	12	formfeed (usually 66 lines)
17150	13	carriage return

The above POKE values are for any Radio Shack line printer. They are in decimal.



ways to hide this line from the video. Assuming you have entered line 10 in the usual manner, go into the EDIT mode on that line SPACE down through the entire line until the cursor is sitting on the last # sign (you shouldn't be able to see it). Press the 'C' key (for change) and then press 'SHIFT' and the 'UP ARROW' together. Your cursor should have jumped up to the line above the one

you're editing. (If you did it wrong you can always start over.) Now press (ENTER). PRESTO! The line is gone from the video. Try to list the line. You'll see a brief flash on the display of where the line should have been and then it will vanish. In the line's present state it will still operate normally in a program but won't show up on a listing, unless you have extremely sharp eyes. However, the

line will still list out normally on the line printer. To retrieve the line you may EDIT it as normal and if you want it to return to normal, just delete the line before the last # sign.

The second method is more devious. Re-enter the line above for our example. Go into the EDIT mode on line 10 as before, but instead of SPACING down through the line, press the 'X' key (for extend). You're now at the end of the line (hopefully) so hold down either of the 'SHIFT' keys and press the 'LEFT ARROW' key. This will operate the same as the regular backspace function except that the characters you are backspacing over won't be destroyed. Continue until you reach the first character on the line (the 'P' in print). You may now release the keys and type in anything you want. When you have typed in enough characters to return you to approximately where you ended the original line, press (ENTER). Now list the line. The only thing that should list is the garbage you typed in. You may, instead of typing in text over the line, simply SPACE BAR down the entire line. This will leave the line number intact but with nothing following it. To return the line to normal go into the EDIT mode on that line and delete it just before the last # sign.

Now to use the method of PEEK-ing referred to earlier. (See Table 1.) Re-enter line 10 (we have to get everything back to normal before starting). This is a Hex and ASCII dump of memory after you type in our test line. As you should already know there are control codes for the TRS-80. These codes are from 8 to 31 (in decimal). They are generally used with the CHR\$(x) command (i.e., to change your video format to 32 characters from 64 you place in your program PRINTCHR\$(23). Now what would happen if we POKEd the decimal number 32 into 17150 (refer to table 1). Try it. POKE



17150,32. Nothing happened, right? Well, not quite. List the line. It went to 32 characters per line if you did it right. Also, the last # sign has been replaced by our POKE, so the line only shows two # signs. (Listed in table 2 are some more examples and results of different POKE values in location 17150).

Why does it do that? Simple. The routine that lists the program to the video gets each byte and interprets it to either ASCII or a command word token so we can read it. When the routine encounters a control code it acts the same as it would if we used the CHR\$(x) command. It doesn't know the difference. Anytime you modify a line using these tactics, do it after a REM statement. The ROM will not evaluate the information following a REM.

Remember, I said these lines would still list normally on a printer. The routine that provides a listing to the video also provides a listing to the printer, and if it finds a valid printer-control code it acts accordingly. (Table 3 shows some printer control codes to POKE in and the results you may expect, if you have a printer).

By taking the ideas mentioned a little further, one could make a program extremely difficult to change. For example, he could do a check for VARPTR(A\$); if it's not where it was originally programmed, then POKE16405,1. This will lock up the keyboard. Or POKE16667,1—this turns on the TRON function. Or POKE16445,8—this changes the video to 32-character mode. Or change the device-control blocks to some other location (MEMORY SIZE). Or clear the video, print "MEMORY SIZE?" at the top left hand corner, use an INPUT command, and then, regardless of what the person types in, stay in a closed loop. Don't forget to disable the 'BREAK' key by POKE16396,165 (SHIFT-BREAK will work then).

## Program Listing

```
00100 ;TABLE4
00110 ;THIS IS A SHORT ROUTINE TO ADD TO THE BEGINNING
00120 ;OF YOUR MACHINE LANGUAGE PROGRAMS. IT WILL REQUIRE
00130 ;THAT YOU POWER DOWN THE SYSTEM TO RECOVER AND WILL
00140 ;AUTOMATICALLY EXECUTE AFTER LOADING. BECAUSE OF THE
00150 ;MULTIPLE ORIGINS THE PROGRAM WILL DEFEAT MOST
00160 ;COPYING PROGRAMS. THIS IS NOT A TRUE HEADER THAT LOADS
00170 ;IN THE REST OF YOUR PROGRAM. TRUE HEADERS ARE MUCH
00180 ;MORE DIFFICULT TO PROGRAM. THE METHOD DESCRIBED HERE
00190 ;WILL WORK QUITE WELL REGARDLESS.
00200 ;TO START WITH WE'LL LOAD UP THE AUTO START ADDRESS
00210 ;WITH JP (HL). YOUR <END> STATEMENT IN EDITOR ASSEMBLER
00220 ;WILL EQUAL (HL). SO THATS WHERE IT WILL JUMP.
00230      ORG      41E2H          ;AUTOBOOT ADDRESS
00240      JP       (HL)          ; (HL)=YOUR <END> STATEMENT
00250 ;OUR NEXT TASK IS TO MAKE SURE THE RESET BUTTON WILL ZERO
00260 ;OUT ALL MEMORY IF PRESSED, SO WE HAVE TO LOAD UP THE
00270 ;RESET VECTOR WITH OUR <BLAST> ROUTINE ADDRESS
00280      ORG      4006H          ;RESET VECTOR ADDRESS
00290      JP       BLAST         ;TO OUR ROUTINE
00300 ;NOW WE WILL ENTER A ROUTINE TO EXECUTE IF THE RESET
00310 ;BUTTON IS PRESSED. AFTER THAT THE REGULAR PROGRAM WILL
00320 ;START.
00330      ORG      4300H          ;BEGINNING OF SUBROUTINE
00340 BLAST LD      HL,4310H      ;POINT TO START OF PROGRAM
00350      LD      DE,4311H      ;ADD ONE TO IT
00360      LD      BC,0BCF0H     ;AMOUNT OF RAM ABOVE PRGRM
00370      LD      (HL),00       ;ZERO BYTE TO CLEAR MEMORY
00380      LDIR                     ;NOW WE LOOP TILL BC=0
00390      STAY      JP      STAY ;AND INTO A CLOSED LOOP
00400 ;FINALLY COMES YOUR PROGRAM. FOR DEMONSTRATION PURPOSES
00410 ;I'LL WRITE A SIMPLE ONE THAT DISPLAYS A MESSAGE
00420 ;ON THE VIDEO AND THEN WAITS UNTIL YOU PRESS
00430 ;THE RESET BUTTON TO ZERO OUT THE PROGRAM.
00440 START LD      HL,3C00H     ;START OF VIDEO MEMORY
00450 CONT LD      A,20H        ;SPACE TO CLEAR VIDEO
00460      LD      (HL),A        ;CLEAR IT
00470      INC      HL          ;NEXT LOCATION
00480      LD      A,H          ;CHECK FOR THE END (4000H)
00490      CP      40H         ;ARE WE THERE?
00500      JR      NZ,CONT       ;NO, THEN LOOP TIL DONE
00510      LD      HL,3C00H     ;START OF VIDEO MEMORY
00520      LD      DE,MESS      ;POINT TO MESSAGE
00530 SHOW LD      A,(DE)      ;GET THE BYTE TO SHOW
00540      CP      00H         ;ARE WE AT THE END?
00550      JR      Z,STAY       ;YES, THEY GO INTO LOOP
00560      LD      (HL),A       ;ELSE SHOW IT
00570      INC      HL          ;NEXT VIDEO ADDRESS
00580      INC      DE          ;NEXT MESSAGE BYTE
00590      JR      SHOW        ;LOOP TIL DONE
00600 MESS DEFB      'PRESS THE <RESET BUTTON>'
00610      DEFB      ' AND SEE WHAT HAPPENS. YOU?'
00620      DEFB      ' WILL HAVE TO POWER DOWN'
00630      DEFB      ' TO ESCAPE'
00640      DEFB      00H        ;END OF MESSAGE BYTE
00650      END      START      ;AUTOBOOT ADDRESS=START
00660 ;THERE ARE OTHER WAYS TO WRITE THE ABOVE ROUTINE
00670 ;BUT I FELT THAT THIS ONE WAS THE EASIEST TO
00680 ;FOLLOW. IF YOU HAVE A LOT OF ROM CALLS IN YOUR
00690 ;OWN PROGRAMS YOU WILL HAVE TO WATCH THAT THEY DON'T
00700 ;USE THE RESET KEY VECTOR. IF IT DOES YOU WILL GET
00710 ;PROBLEMS. OBVIOUSLY.
```

### Sky's the limit

In machine language you can become as elaborate as you want. More work sometimes goes into the loaders of some programs than into the programs themselves. Most copying programs only check for one ORG in a program. If, when you enter your program using Editor Assembler for example, you have multiple ORG's, the copy program

won't work.


Another neat trick is to program a loader that loads up the video with a graphics display after the main program is running. Table 4 shows an assembly language subroutine to add to the beginning of your program. It will automatically execute after loading, if the RESET button is pressed, it will zero out your program. Now that's protection. 





PHOTO BY KENNETH W. SCHROERS



## EDUCATIONAL COMPUTING

# Coming To Terms With Computer Literacy

Being literate today doesn't mean you'll be literate tomorrow . . .

**J**ust a few years ago literate people were people who could read and write, and literacy in the printed word was a major goal of education. But, just a few years hence, the term may often be associated with those who can speak and teach the language of computers. What is computer literacy, what are the reasons for the interest in it, and how can we become computer literate?

### Computer comfort

Beverly Hunter of the Human Resources Research Organization assigns a very general definition to computer literacy: it is "whatever a person needs to know and do with computers in order to function in our information-based society." Functioning comfortably with computers is the key element. In computer literacy, we're not talking about abstract knowledge of computers; rather, the term refers to a person's ability to use a computer.

Key figures in the computer literacy field suggest that being computer literate means we can use computers as a problem-solving tool for many aspects of life. David Moursund, Editor of *The Computing Teacher*, stresses that "computers are an everyday working tool like reading and writing." In other words, we should feel as free and easy using them as we do using books. Computer literacy, accord-

ing to Moursund, includes an understanding of how computers aid problem-solving in any discipline.

To Arthur Leuhrmann, President of a company called Computer Literacy, Luehrmann, says that computer literacy is being able to "do computing", just as print literacy is being able to *do* reading and writing. He says the key question in deciding whether someone is computer literate is "whether that person can use computers to solve a problem."

Just how much about computers do we need to learn to be literate problem-solvers?

"People are computer literate when they can determine how to make the computer do what they want it to do," says Karen Billings, director of the Microcomputer Resource Center at Columbia Teachers College. Billings notes that someone teaching a course about computers requires more knowledge of them than a teacher who just wants to load and run a drill and practice program. To some people, computer literacy is the ability to write programs; to others, it is the ability to give effective instructions to a programmer.

### It's catching on

Although the concept of computer literacy has been around for 10 years or more, it did not attract serious attention from U.S. school systems until the last few years. Now, it

*continued on page 60*



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continued from page 57

seems, everyone's into the act.

Organizations like the National Council of Teachers of Mathematics have recommended inclusion of computer literacy in the math curriculum. Florida has determined that computer literacy is a necessary component of education. Pennsylvania is field testing a computer-literacy program that is expected to become a statewide seventh-grade course. The U.S. Department of Defense, which is responsible for the education of children of military personnel overseas, is planning to extend its calculator-use program to include computers. The National Science Foundation has funded the Montgomery County schools and the Human Resources Research Organization in Virginia to develop a set of computer-literacy goals for

kindergarten through eighth grade. And the list goes on.

## Micro madness

What are the reasons for this period of ferment in computer literacy? One basic reason is the availability of the inexpensive microcomputer. Luehrmann points out that when computers were beyond the reach of most people, a goal of universal computer literacy was not reasonable. Now computers cost less than \$2,000, and it is possible for every student to get access to one—if we decide as a society that that is important.

Certainly a major impetus to achieving computer literacy is the impact of computers on the workplace and job market. Fifteen years ago engineers, managers, and accountants could do their jobs

without ever touching a computer or seeing a computer printout. Now these people are inundated with reports and analyses of one kind or another, all prepared by computers. And high-school students planning on entering the work force after graduation will more than likely find a computer awaiting them in entry-level jobs. Indeed microcomputers are ubiquitous to the working environment, and as they become even more pervasive in society as a whole, no one will be able to afford to feel threatened by them. We need to look upon ourselves, says Moursund, as being in charge of computers.

As Luehrmann points out, 50 percent of all jobs are in the information field, and a computer is the information machine. Computer literacy can mean a better paying job. Luehrmann has estimated, for ex-

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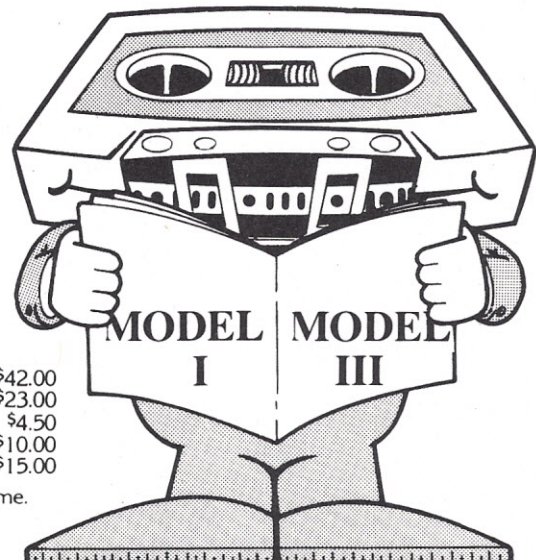
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by Clyde Cload, star reporter



# CLOAD

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ample, that computer literacy will bring a \$1,000 higher starting salary.

These are powerful arguments for teachers and parents to consider if their goal is to prepare children to function in these new work environments.

### Programming polemics

Educators are now in the process of defining computer literacy more precisely, deciding in what grades to teach it, whether it should be part of all subjects or a special subject, and just how to teach it.

One controversy that has emerged is whether or not a student must learn programming to be computer literate. Two different approaches have emerged: one emphasizes awareness of computers, their uses in society, and what computers can and cannot do; the other approach

includes learning a programming language as well.

A curriculum nowadays is broken down into specific learning objectives, sometimes expressed in terms of behavior. A list of learning objectives for computer literacy published in the *Mathematics Teacher* in February 1980 details both types of objectives in an attempt to define computer literacy in its broadest terms.

In the area of computer awareness, the list includes items that require the student to learn basic concepts of computer: hardware/software components of a system, algorithms, binary code; recognize computer use in many fields; recognize the impact of computers in society; and understand ethical and privacy issues.

People who argue for the com-

puter awareness approach, including teachers and others, stress that learning one computer language may limit your understanding of computers to what that language can do, and to what the student as a novice can do with it. Further, most people will never actually program a computer in their work, so their time is better spent building an understanding of all the ways computers can be used.

The other approach emphasizes actual writing of programs. Luehrmann, for example, says that students must learn to write for the computer just as they write paragraphs today, expressing ideas in the form of a computer program. "A paragraph is an intellectual tool; so is a computer program," he says. Children should add the program-

*continued on page 64*

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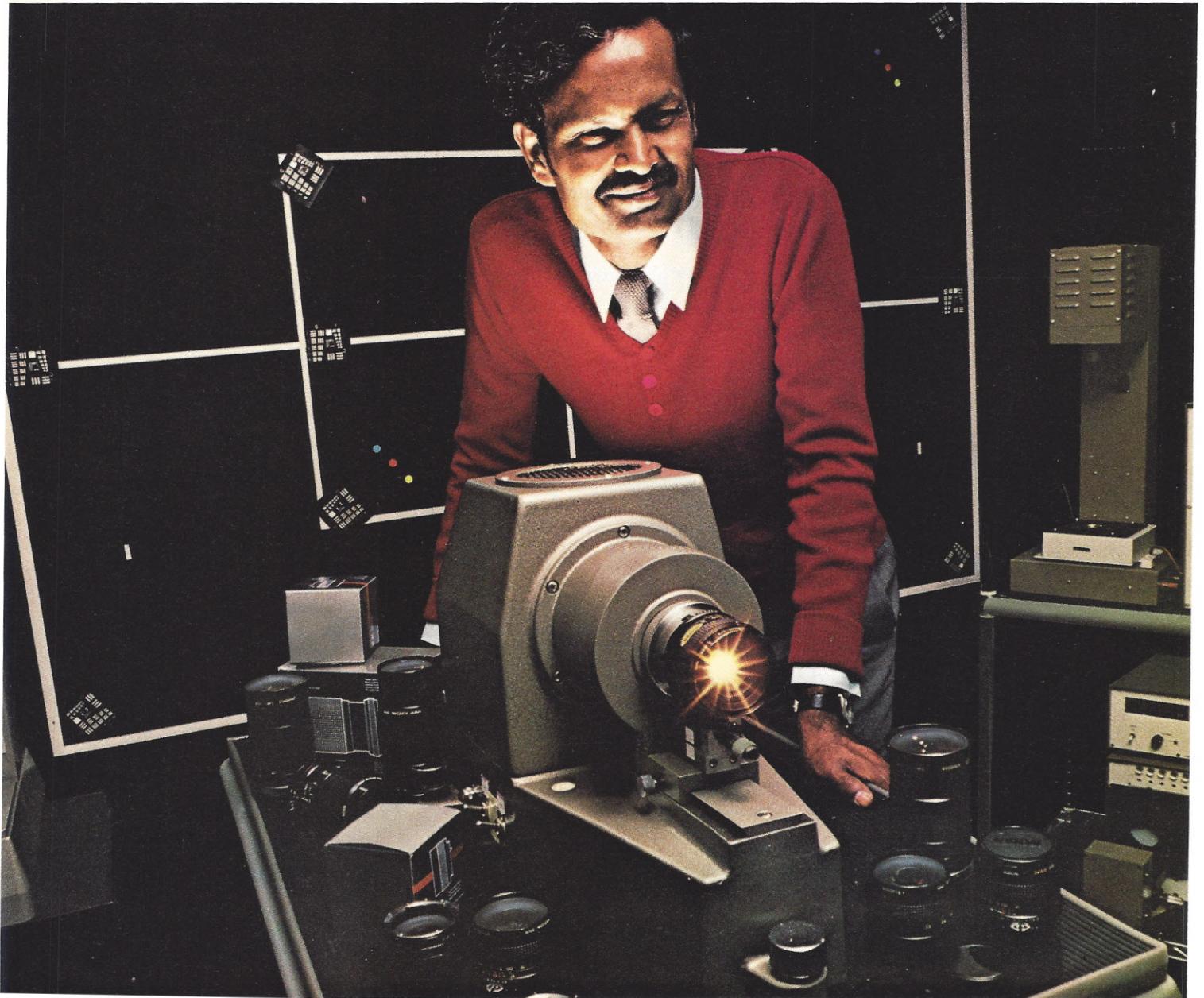


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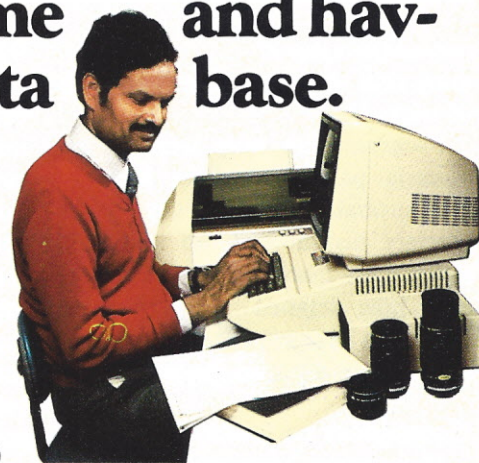
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*continued from page 61*

ming skill to their intellectual "bag of tricks."

Programming may well be an essential part of computer literacy. It is probably the best way to appreciate just how dumb and how smart these machines are, to appreciate how detailed and precise instructions have to be, and to see how errors can creep into the process.

## Computers as teachers

Computers have proven themselves wonderful teaching machines. But can they teach us about computers and teach us to program? If they could, they'd help in overcoming one of the major stumbling blocks to computer literacy—the lack of computer-literate teachers. As Moursund points out, the person teaching a literacy course in the near future will probably be at a low level of knowledge, and this will severely limit what can be taught.

To teach us to program, a computer would have to have a set of software designed to teach programming. Most schools today aren't using such software. There just isn't a great deal of such material available, and schools may not be aware of what is available or are not able to find material that meets their particular needs. Of course, some schools prefer teaching programming with traditional techniques—a teacher, books, paper, and pencil. Luehrmann asserts that print-based materials are better for teaching programming. They're straightforward, and you know who is in charge when you do sit down to the computer. Otherwise, Luehrmann says, there is doubt about whether you made something happen or the program did it.

Others, including Billings and Moursund, contend that a mix of computer-based, print-based, and teacher-directed lessons will probably work best.

## Books or bytes?

What should a programming course—in software or book form—include? It should certainly include computer terms and some notion of how the computer system handles information. It should, of course, teach the words of the computer language and how they go together. According to Billings, too many courses stop there, teaching only the rules for using the words; actual practice in writing and testing a program is essential. She would also like to see students learn procedural thinking—setting up a logical approach to doing something.

Luehrmann says that good instructional materials would also give students a feel for programming style: breaking up material into blocks, writing so someone else can read your program, etc.

There are other standards by which to judge any instructional materials, such as clarity of instructions and text; correct order and pacing of topics; and appropriateness of teaching techniques. For tutorial materials, especially in computer form, add such criteria as ease of use; presentation of material in small units, with questions after each unit; "branching" to more information on incorrect answers, and other standards, by which software can be judged.

Now let's look at five sets of material for teaching programming and see how well each of them meets these criteria and how effective each of them would be in promoting computer literacy. Four of the courses are in the form of software; one is a print-based course.

### The Teacher Plus

Charles Mann and Associates, \$39.95

**Medium:** Apple disk (Applesoft)

**Covers:** Complete coverage of BASIC commands and high-resolution graphics, including all string

functions and editing and system commands.

**Teaching Approach:** The course presents information on commands and processes by giving you written explanations on the screen, pausing frequently to ask, "Do you understand?" If you respond "No," you get more information or a summary. The course shows many programs, then allows you to RUN them and see the results, and then explains them line-by-line. At the end of each lesson, you're given a suggestion for a program to write.

Allowing you to get extra help is a plus, as is showing real programs and running them. The programs are exclusively mathematical examples, however.

**Ease of Use:** There are some real problems in using the programs, primarily because of poor "error trapping." For example, the very first lesson begins by asking, "Do you want to learn BASIC?" If you don't type "Yes," but perhaps press the return key (or if you accidentally pressed it while loading the program), the program says something like, "Sorry to hear that," dumps you out of the program, and seems to kill the program as well. All of which is rather disconcerting for the beginner. In several other places it is easy to drop out of the program as well.

In that first lesson it was impossible to tell how to advance the material on the screen to see the next bit of information. This wasn't a problem later, but it is very disturbing in a *first* lesson.

**Screen Use:** Often the program makes good use of the screen for displaying information. Much of the time, however, the whole screen is filled with print, which makes it difficult to read.

**Quality of Writing:** The quality of language is adequate, although sometimes a bit awkward. The pro-



gram is full of punctuation errors, though. For some incomprehensible reason, the writer used almost no periods and commas in the text. There were spelling errors and typos and some grammatical errors as well.

**Clarity:** The material presented is correct, very complete, and the examples generally reasonable, but it is generally too complex to be clear to the beginner. Sometimes there is an assumption made that the learner knows math concepts or computer concepts which the beginner would not necessarily be familiar with.

**Use of Questions:** Questions are not frequent enough. The user should be testing newly acquired knowledge every time a new concept is introduced. Another flaw is that the question frequently disappears before you are shown the correct answer.

**Branching:** Some branching is present. You get more information if you say you don't understand something.

**Pacing:** Material is presented in a reasonable sequence, but it is too fast for a beginner. You're plunged into rather complex explanations, and even the extra help available on branching wouldn't clarify things for an average beginner.

**Program Writing:** Requiring programs to be written is a real plus. But program writing should be started earlier. No program is suggested until the user has been exposed to five or six concepts and terms. The user should be writing programs or commands as soon as the first word is introduced and writing new programs each time a new command is learned. In that way the user will integrate each new step.

**Overall Rating:** This course appears to have been written by someone with good programming skills but no real knowledge of how to develop learning materials. Still, despite this and all the negatives above, it could be helpful to some people.

#### Basic Tutor

Educational Courseware

\$15 for each of 6 courses in series

**Medium:** Apple disk (Applesoft)

**Covers:** Computer's general operation, system commands, and some programming statements. [The remaining BASIC terms and system commands (with the exception of some string commands) are covered in the remaining disks.]

**Teaching Approach:** This course takes a rather unique approach to teaching programming. The whole course is "menu-driven." You are

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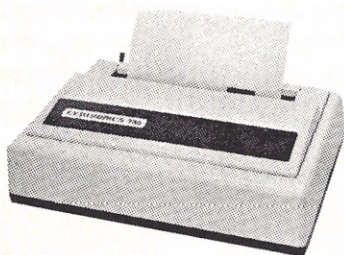
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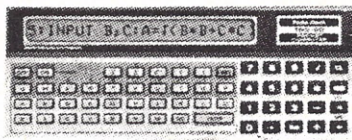
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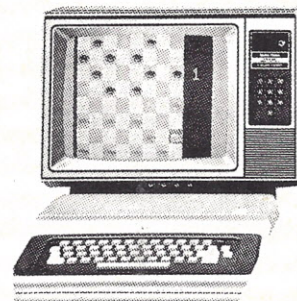
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presented with a list of choices of what you can study. When you select one general area (such as system commands) you are given another menu of choices of topics within that area (say LOAD, RUN, etc.). You can explore these choices one at a time and get information on that topic. You can do the topics in any order and repeat them as often as you like. Essentially the course is like an automated programming manual, explaining whatever command or concept you look up.

This approach is good because it gives the user control over the learning process. However, there is very little pulling together of all the different pieces of information. And there are too few program examples to show how all this fits together.

**Ease of Use:** Instructions are simple to follow. Generally the course works very well, except in one program where the program is supposed

to send you back to the menu and doesn't.

**Screen Use:** Use of the screen is usually very good. Some type appears "billboard style," a character at a time—a nice variation. Text is well spaced, easy to read. A very clever graphic is used to show parts of a computer system and how information passes between the parts. Components are placed on the screen one at a time and information transfers are explained and shown with noises and arrows.

**Quality of Writing:** The quality of writing is very high, with simple, short, easy-to-understand sentences.

**Clarity:** The information presented is exceptionally clear.

**Use of Questions:** There are several quizzes presented as choices on the menus. They test the terms and concepts covered in that section of the course. This means that you're tested on a whole body of knowledge

instead of on each piece of information as it's presented.

**Branching:** There is no branching on errors.

**Pacing:** There is a serious problem here in that there just isn't enough information on the commands and concepts covered for the beginner to be sure of picking up necessary knowledge.

**Program Writing:** This is not required or suggested—a very serious flaw.

**Overall Rating:** This course certainly presents information clearly and concisely and in an interesting fashion. It won't overwhelm novices or take them out of their depth, and it would give them a general grounding in BASIC.

## Programming In Apple Integer BASIC

Hayden Book Company, Inc.

\$39.95 (disk)

\$29.95 (cassette)

## Two Ways to Learn Programming

At the George Washington Junior High School in Ridgewood, New Jersey, students receive computer literacy instruction from tried-and-true methods—mimeographed sheets and teacher instruction—plus computer time for practice.

The computer literacy course began about five years ago on time-shared terminals. Today it is done with personal computers and terminals. All seventh graders get hands-on experience with drill programs to give them a feeling for the computer. In the eighth grade they can take a short ( $\frac{1}{2}$  year) computer awareness course with a little programming included. Advanced-math students can take a longer course with the emphasis on programming. In the ninth grade any student can take a quarter-year programming course.

What are the students' reactions? Dennis Kaminski, who taught the course says it's just like any other subject. Some students really take to programming and write some good, complex programs. They'll come in after school or before school to do more work and to share what they've done with others. Kaminski points out that it's not necessarily the top students who do


well. Many average students find that programming is easy for them.

The drop-in computer center in Ithaca, New York, uses software to teach programming. Run by the Wolfdata Software and Hardware group as a community service for Ithaca's children, the drop-in center has served hundreds of kids in the last four years. The students, typically sixth graders and up, sign up for free computer time. They start by playing computer games during their time. They gradually become curious about how the games work and try modifying them. At some point they become curious enough about programming to take a course where the computer (an NCR 7200) acts as the tutor and instructor.

Carl Frederick at Wolfdata feels that because the programming course is given by the computer, the kids are constantly reminded that they are not in school. They are learning because they want to, not because they have to.

The children use their knowledge primarily to write games, and many have become expert programmers. Frederick comments that the "kids quickly get on top of the technology instead of being controlled by it."





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CIRCLE 30



**Medium:** Apple disk or cassette (Integer BASIC)

**Covers:** The course covers all the Integer BASIC commands and programming concepts.

**Teaching Approach:** This course takes a traditional tutorial approach to teaching. Information is presented on the screen and then questions are asked about it. Sample programs are shown on the screen.

The program allows you to respond to questions with a 0, indicating that you don't know enough to answer the question yet. The program then branches to more information on the subject at hand. An input of 9 gives you a menu of options—repeat the section, skip to a new section, see the table of contents for the lesson, or quit the lesson.

Allowing the user to get help and to control the program gives the learner control over the learning process, which is sound pedagogy. The choice of approach as a whole is sound, although I have some problems with its execution.

**Ease of Use:** The programs are exceptionally easy to use, and the instructions for using them are admirably clear.

**Screen Use:** Too often the whole screen is filled up with text, making it hard to read. However, good use is made of the screen at other times.

**Quality of Writing:** The writing is clear and free of errors, but it is at a rather high difficulty level. Consider this sentence describing an IF-THEN statement: "The computer will transfer to the indicated line on the condition that the mathematical relationship is true." The sentence is accurate, but too abstract for many people.

**Clarity:** There is a variation in the clarity of lessons. Some topics are presented clearly and well: Strings, for example, are clearly defined and described. Other topics (perhaps one-fourth) are not presented clearly. The concept of arrays, for

example, is handled very poorly. The program gives you detail on variable names, setting up arrays, and other topics. Unfortunately, it doesn't explain why you'd want to use an array at all.

**Use of Questions:** There are questions after many segments of information, which is certainly good. But there are many segments without questions, and learners may get lost before a question appears and alerts them to the fact that they might have missed something.

The wrong kind of questions are often asked. The learner is simply asked to parrot back a definition, rather than being asked to apply what has been learned. There is an art to writing questions that will advance the learning process rather than just test for rote learning, and this course doesn't exhibit that art.

**Branching:** Branching is done on wrong answers or on an entry of 0.

**Pacing:** Material is presented in a reasonable sequence. With the exception of times when concepts are

## Ways to become literate: A Personal Computing curriculum

**From Creative Computing Press**, 39 East Hanover Avenue, Morris Plains, New Jersey 07950 . . . .

Ahl, David. *The Best of Creative Computing*. Collection of articles originally published in *Creative Computing* magazine. A general overview of a number of topics in the computer field.

Ball, Marion and Chapp, Sylvia. *Be a Computer Literate*. Overview of computers and how they work. Includes chapter on how to write a simple program.

**From Thomas Y. Crowell**, 10 East 53rd St., New York, New York 10022 . . . Porter, Ken. *Computers Made Really Simple*. How a computer processes information and how you work with a computer.

**From Hayden Book Company, Inc.** 50 Essex Street, Rochelle Park, New Jersey 07662 . . .

Coan, James. *Basic BASIC*. An introduction to BASIC programming in a mathematics setting.

Coan, James. *Advanced BASIC*. More complex mathematics applications.

Simon, David. *BASIC from the Ground Up*. A nonmathematical approach to BASIC.

**From Radio Shack, Inc.**, Fort Worth, Texas 76102 . . .

*BASIC Computer Programming*. Introduction to computers, writing programs.

*Getting Started with BASIC*. Introduction to Level II BASIC and Model III computer.

*Level II BASIC, a Self-Teaching Guide*. Programmed instruction in BASIC.

*TRS-80 Assembly-Language Programming*. A guide to assembly language for the programmer who wants to extend his programming knowledge beyond BASIC.

**From Sterling Swift Publishing Co.**, P.O. Box 188, Manchaca, Texas 78652 . . .

Poirot, James and Groves, David. *Computer Science for the Teacher*. Computer literacy—not programming—for the teacher who has to teach a course in computers.

**From John Wiley & Sons, Inc.**, 605 Third Ave., New York, New York 10017

Albrecht, Bob, LeRoy Finkel, and Jerald Brown. *Atari BASIC*. A self-instructional programmed text in BASIC for the Atari computer.



just plain poorly presented, the depth and pace seems reasonable.

**Program Writing:** The program does not require program writing—a very serious flaw.

**Overall Rating:** In comparison with the other Apple courses (which teach Applesoft, not Integer,) this would probably be the most effective at teaching programming. It does, however, have some serious flaws. It's a shame that the authors didn't pay more attention in the course to making sure meaningful learning, rather than rote learning, was taking place.

Many people would be able to learn programming on their own with this course, provided that they set themselves the task of writing programs after each lesson and used the commands they had just learned in those programs.

## Part 1: Introduction To BASIC

## Part 2: BASIC Programming

Radio Shack, Inc.

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Part 2: \$199

Workbooks extra.

**Medium:** Three three-ring binders containing approximately 300 overhead transparencies, plus teacher's guide and student workbooks. For TRS-80 Level I or Level II.

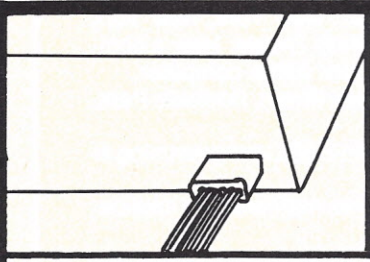
**Covers:** All BASIC and system commands, writing programs, graphics. Part 2 covers Level II BASIC.

**Teaching Approach:** The course is designed to be presented by a teacher using the transparencies one at a time and discussing each one according to the instructions in the guide. Students follow along by taking notes in the student workbook, take a quiz in the workbook for each les-

son, and then do assigned practice programs on a Radio Shack computer.

Essentially the material is designed to assist the teacher who is not very familiar with computers and programming to teach computer literacy to a class. It structures every lesson and everything the teacher should say so that this teacher can give a course just like very other teacher using the materials. This is probably a very good notion when most teachers are not very computer literate themselves. The teacher will have to have some knowledge of programming, however, to be able to follow the instructions.


**Ease of Use:** The materials are very simple for both teacher and student to use. A few minutes overview should show the teacher how to handle the materials. Perhaps more in-



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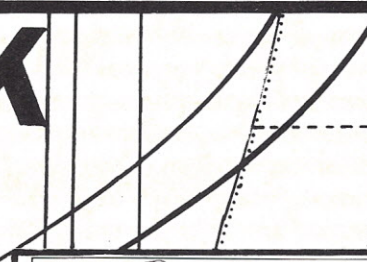
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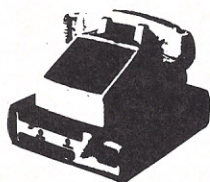
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formation should be presented on what's covered in the two courses and how they fit into a set of computer literacy objectives.

**Screen Use:** In this case text is presented with an overhead projector, and layouts are very clear, with huge type for readability.

**Quality of Writing:** Generally very clear and appropriate. At times the language is overly formal and difficult for a high school or junior high audience. It seems more suited to an adult audience such as one which would be found at the Radio Shack computer center.

**Clarity:** Generally very clear.

**Use of Questions:** Questions are given at the end of each lesson in the form of a quiz that students correct themselves. Problems caught at this point could presumably be corrected with teacher help.

**Pacing:** Order of presentation, depth of information, and speed of presentation are very good. Each lesson begins with a review of previous material, which gives everyone a second chance to be sure material has been understood.

**Program Writing:** A very strong point of the course is the inclusion of sample programs for the students to enter, RUN, and sometimes modify, and of assignments to write simple programs. Answers are given for these programs as well. The program writing adds immeasurably to the value of the course.

**Overall Rating:** This is an excellent course for classroom use. Some of the course, however, emphasizes terminology rather than substance at some points. Overall it seems to me that it is possible that teachers and students will get bored with the huge number of transparencies and the repetitiveness of the procedures, but at least they won't be lost or bewildered. With a teacher with some experience with the TRS-80, this could be extremely effective in teaching computer literacy.

## Level II BASIC Course

Radio Shack, Inc.

Part 1: \$14.95

Part 2: \$19.95

**Medium:** 4 cassettes in each course, Level II BASIC, 4K RAM.

**Covers:** Part 1 covers all simpler BASIC commands, including graphics. Part 2 covers more advanced commands.

**Teaching Approach:** This is a straightforward tutorial in BASIC. Material is presented on the screen and followed by questions. Sample programs are shown and explained line-by-line. There is nothing terribly innovative about this approach, but it is a very reasonable one and executed quite well.

**Ease of Use:** The course is easy to use. You simply press any key, probably the space bar, when you have read the material on the screen and are ready for more. You control the speed of presentation yourself.

The course is divided up into 4K segments, meaning that each of the lessons has to be divided up into parts which you load one at a time as you progress through the lesson. This means that every few minutes you are loading another segment, which is somewhat annoying. It also means that the course can be used with a minimal hardware configuration. Some problems exist with tape loading and being able to load some programs at all.

**Screen Use:** The screen is used quite effectively. Occasionally the screen fills up with too much information, but at least it appears a line at a time as you press the space bar so it's not too overwhelming. Programs are displayed and explained very effectively on the screen.

**Quality of Writing:** Writing is good, but not as simple as it might be. Simplicity is a virtue in instruction in a potentially confusing topic.

**Clarity:** Information is generally clearly presented, but is sometimes

too complex. For example, in explaining the use of the semicolon, the program keeps saying that it suppresses the carriage return. This is true, but it would be clearer to the novice to stress that what follows will be printed on the same line.

**Use of Questions:** There are not enough questions. The learner gets through a great deal of information before a question is asked, and typically there is only one question on that information. The questions are generally good though, focusing on what will result from a program rather than on definitions.

**Branching:** There is no branching to extra material or repeat material. Lessons are short enough so that one could repeat them. A very nice feature is that when the learner enters a wrong answer, the program explains quite carefully why that is not the correct answer, before asking the learner to try again.

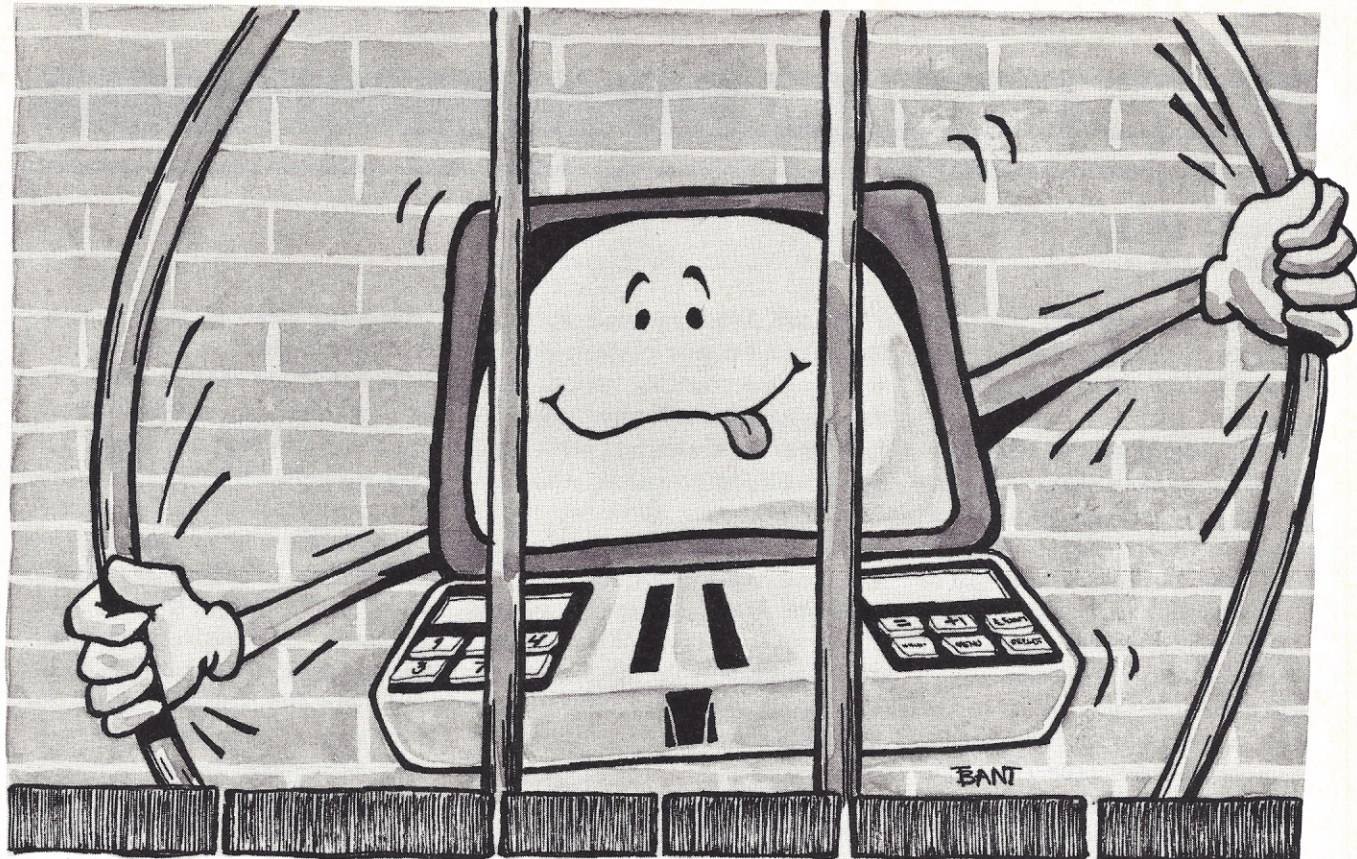
**Pacing:** Order and pace are good.

**Program Writing:** The course does require some program writing—a real plus. It also gives a possible solution to the problem posed by showing a program that would work. This seems to be unique to this course. The course does give the user a good deal of information on program commands before assigning each program. Since the course is broken up into so many parts, it might have been wise to have a program assigned after almost every part—making a virtue out of a necessity.

**Overall Rating:** A good, solid course in programming. With some persistence (required in any self-study course) the user should do very well and benefit from the course. Of course, we are assuming that the tapes will load well for that user. Greater simplicity and clarity, along with more frequent questions and program assignments would insure that more people could benefit from the course.







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## General Ledger Packages

continued from page 34

tions) and numbers, and functions and subfunctions organized according to a traditional and acceptable structure.

All 20 programs have some kind of flexible account-numbering system. All but two assign numbers (from four to nine digits). The flexibility of a numbering system can be determined by how many accounts, departments, divisions, subsidiaries and subaccounts are allowed.

**General Journal.** This incorporates the chart of accounts and the accumulated totals (and often percentages) for each account, as well as overall summary totals of a company's financial activities. It is produced at the end of a reporting period, usually a month, a quarter of a fiscal year.

**Periods.** Most packages allow 12 months and a year-to-date, or previous year accounting periods, and store information for that long. A few store only the current period and year-to-date information, while advanced packages allow up to 12 previous months, a current period and the current year's budget.

**Audit Trails.** These are reports that print out records of transactions at certain points during processing, and enable auditors to make sure the company's accounts are being handled properly.

**Menu-Driven.** This feature means that the program has a "tree structure" and is very easy to use. A user interacts with the program by choosing from a list of options. A menu-driven program also contains a lot of

"prompts," that is, hints and instructions to users.

**Consolidation.** This means that a G/L package can accept information from different departments of company units and consolidate them into a summary or G/L report.

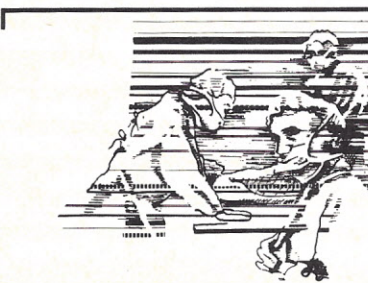
**Integration.** This feature enables a G/L package to be directly linked to other accounting software, most commonly accounts receivable, accounts payable, payroll and inventory. Only the best accounting systems also provide direct links to other accounting packages, such as sales order entry and job costing. Some G/L packages only integrate one or two other accounting packages, while a few do not integrate with others at all.

Remember a rule of thumb about

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**G/L integration:** The more easily and quickly other packages post their transactions into G/L, the more easily a system integrates.

**Automatic Posting.** With this feature the computer records transactions directly into each separate account without a user's assistance.

## Common reports

There are up to 10 common reports in most G/L packages. Following the wave of change, most have some kind of flexible report generator. A report generator allows a user to establish—within limits ranging from very broad to very narrow—the parameters for reports he or she wishes to see. Often, a generator, such as that in Prodigy's PROTEGE, lets a user define reports within ranges of dates, accounts numbers, reporting periods, and other criteria.

Common reports include:

- Balance sheet;
- Profit and loss statement;
- Trial balance—regular or comparative;
- General journal;
- Master chart of accounts of master-file listing;
- Transaction listings (data-entry edit lists);
- Cash-receipts journal;
- Cash-disbursements journal;
- Multiple-department, division, subsidiary or company reports;
- Comparative income and comparative budget statements.

## Capsule summaries

The following are capsule descriptions of 20 general ledger packages. This is by no means a complete description of each package; it only highlights some major advantages and disadvantages. Refer to the Ven-

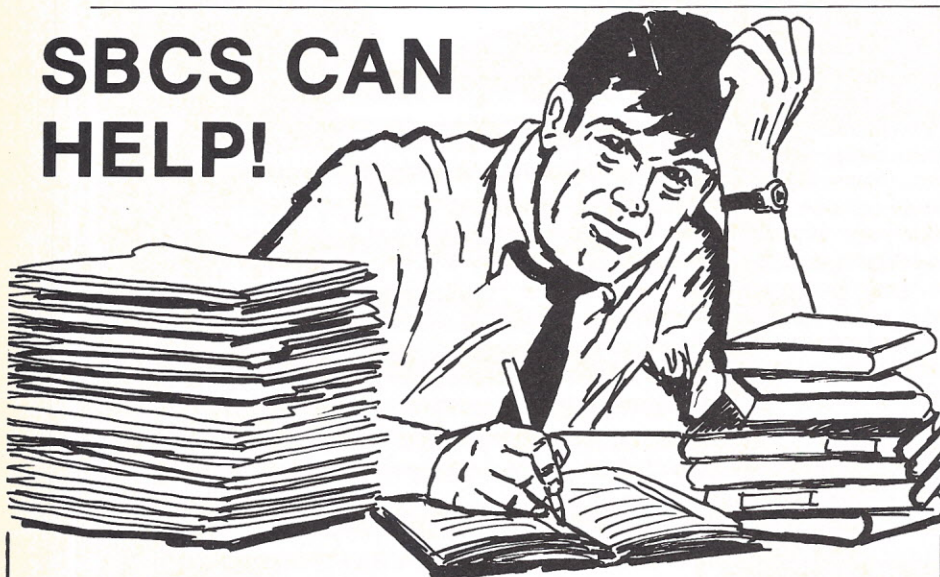
dor's Guide and the Chart of Features and Reports for more details.

When you begin your search for a G/L package, remember that it should fit the size of your business and provide the features and reports you need for your small business or accounting firm. If you want only a P&L statement and a balance sheet each month and an annual trial balance, don't spend hundreds of dollars more for a package that gives you up to 30 types of reports. If you have only 100 accounts and 2,000 transactions a year from one company with no departments, and you don't anticipate burgeoning growth, do not buy a program that has a capacity of 50 departments or subsidiaries, 1,000 accounts and 10,000 transactions. In short, use your head for something besides temporary mass storage.

**American Business Systems, Inc.** is designed for larger small or medium-sized businesses or CPA practices. It includes five standard reports and a report writer, plus a numbering system for up to 99 companies or divisions, 9,999 accounts per company, and 99 subaccounts per department. The report generator is table-driven for five reports, but also allows a user to set parameters for comparative trial balances and reports. Its comparative data is produced in both numbers and percentages. A new version will be introduced by the end of this summer; it will have even better reporting capabilities, according to a company spokesman. The ABS system also completely integrates with four other accounting modules.

**Business Enhancements Computer Service (BEC)** produces the most complete line of accounting software for the Commodore PET and CBM lines in its Accounting III and IV line. Its G/L package integrates with five other accounting packages, and its capacity is 900 accounts per diskette, with the number of transactions

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Some G/L features are:

- extensive error checking and user prompting
- numerous report options
- 2000+ entries per session
- departmentalizing
- complete freedom in formatting reports and defining chart of accounts
- budget reports

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CIRCLE 37



per period limited only by disk capacity. It produces four common reports and listings, and its latest version includes the chart of accounts and the transaction listings file on one diskette.

**BPI Systems, Inc.** offers a sophisticated (for the small Apple II disk drives) G/L package. It produces 12 reports, including four that no other package offers, such as its merchandise-purchased journal. It integrates with four other modules, each of which is structured in the same way. However, BPI G/L does not do comparative reports as do others of its size and sophistication. It is also limited to companies with less than \$5 million sales because AppleSoft only allows nine-digit precision math. However, its operations and report formats are superior, as are its documentation and manuals.

**COMPUMAX, Inc. MICRO-LEDGER** is a simple G/L package based on two files, a permanent chart of accounts, and a journal file (or transaction file). It generates three common reports in a simple format, but integrates completely to four other COMPUMAX accounting packages.

**Computer Products International, Inc.** offers the most complete and best payroll interaction of any G/L package. It produces six reports, including a comparative income statement, and has simple, easy-to-understand manuals. Its G/L includes complete payroll-file maintenance for employers and employee master files, and allows complete interaction between the G/L and payroll. Three other accounting modules integrate with it, too.

**Cromemco General Ledger** produces more than 40 reports on ordi-

nary paper, is a complete double-entry accounting system, has a flexible report generator, practically unlimited transaction and account storage, and completely integrates with three other accounting packages, but not payroll.

**Designer Software's Palantir** (taken from the name for the Hobbit's crystal ball in *The Lord of the Rings*) is a sophisticated program written for CP/M. Its advantages include complete account numbering and set-up flexibility. It carries 12 open months, which means you do not have to close your books each month to provide storage space for more transactions. It prints special reports at any time without your having to sort through the entire chart of accounts. And it has an automatic audit trail that can not be avoided; it prints out as soon as journal entries are completed. It has a

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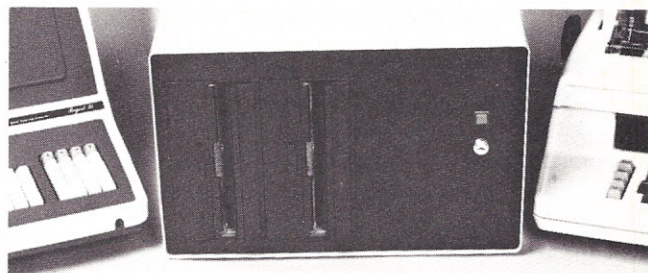
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flexible report generator that allows balance sheets and P&L statements by costing methods, profit centers, consolidated departments or vertical applications.

**Palantir** comes with good manuals with appendices that assume that the user is not familiar with accounting principles. They are based on a humorous "how-to" example called Smallville's Mustache Manufacturing.

However, its capacity is limited by disk size and density. On a single-density floppy, you can store 150 accounts and up to 2,500 transactions—enough for most small businesses, but not for extensive storage of many clients on one disk.

**Durango General Ledger** is a scaled-down version of the well-known MCBA G/L package. Durango tries to sell its excellent G/L as a total system with its hardware and four other accounting packages for about \$10,000. It sells its G/L separately for \$675, but all five for \$1,195. It is also designed to be used in a multi-user environment in which two or more users are interacting with the accounting packages at the same time. It produces eight common reports and four supporting schedules. It has completely flexible account set-up and report-generating capabilities.

**Graham-Dorian General Ledger** is an on line, or continuous, posting package that produces five standard reports, and has flexible account set-up procedures. It also provides comparisons with the previous year and keeps a 14-month history of the accounts. This package also integrates with four other GDS packages, including Cash Register. Although its capacity is relatively small, this program is quite adequate for small businesses.

**International Micro Systems** not only produces six common reports and supporting schedules, but also allows for financial ratio analysis.

IMS President William N. Watson adds that this analytical capability "lets a user calculate basic ratios with current information quickly. You can compare the company's cash position as a whole to your total debt, for example, in seconds."

The IMS package also has consolidation features, and holds up to 750 accounts and 7000 transactions. It was designed for small to medium-sized companies and accounting practices. It interfaces with six other IMS accounting packages, including job accounting, cash receipts and cash disbursements, but only with monthly summaries fed from the packages to the G/L.

**North Star Computers' ACCPAC General Ledger** is directly tied to the company's accounts-receivable and accounts-payable programs. Users must combine the company's "NorthWord" word-processing program with the G/L package to develop a report generator. The G/L package itself can define up to 900 accounts, store net balances for each of 24 months of transactions, and carry budget figures for each of 12 months. But it is batch processed, and each batch is limited to 50 transactions at a time. It produces five common reports.

**Ohio Scientific's General Ledger** is based on its data-base management and "Query" inquiry system. Its functions are based on four groups: data entry and posting, report printing, file maintenance, and general utilities. It produces nine reports, including several editing journal files and a condensed (or summary) G/L.

**Retail Sciences' Peachtree General Ledger** is completely integrated with the company's other accounting packages and is based on the same easily understood manual formats. However, compared with others, it is a limited program, although one that is excellent for many small businesses and accounting

firms. It produces more than half a dozen common reports, has flexible report generation and account set-up procedures, includes 12 months and a previous year-to-date category, and has a fast response time. However, its batch-processing time is somewhat slow. It produces control reports on all activity, gives an automatic out-of-balance signal at the end of transaction entry, and has a correction feature included in its transactions-entry menu, according to Allan Novick, a programmer/analyst with Marx Brothers in Greenwich, CT.

But it has a problem in report printing; it has no easy exit when a report is being printed, and a user must reset the whole program to stop printing a report.

**Peachtree's Client Write-Up and Posting** package for accountants offers three additional reports: statement of financial position, cash flow, and a user-definable chart of accounts, according to Gunner Froebel, president of the new software distributor, WESTICO, Inc., in Norwalk, CT. (Froebel uses the Client Write-Up package, instead of the regular Peachtree G/L, to keep his company's books.) He adds that it also has a "Speed Entry" feature for transactions and can carry accounts in two ways. The client write-up package is more than twice as expensive as the regular package, and is designed especially for CPAs and accounting firms.

**Prodigy Systems' PROTEGE General Ledger** is part of this rapidly growing company's turnkey system and is among the most sophisticated offered by any micro hardware or software company. The PROTEGE G/L is special for a number of reasons, according to Seymour Merrin, president, Computerworks, Westport, CT. (Merrin uses the PROTEGE G/L and the Prodigy One to do his bookkeeping, too.) It is written in Prodigy's own "virtual" code



# T/Maker II:<sup>TM</sup> it not only does more than VisiCalc,<sup>TM</sup> it does it on your computer.

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**As an example of what T/Maker II can do, see the chart below. The operator entered only the data shown in boldface. T/Maker II calculated and reported all the other values.**

	— Actual —			Growth Rate	Average	Total (000's)	—Projected—		
	1978	1979	1980				1981	1982	1985
Item A	42,323	51,891	65,123	24.04	53,112	159.34	80,782	100,206	191,262
Item B	45,671	46,128	49,088	3.67	46,962	140.89	50,891	52,761	58,791
<b>Total</b>	87,994	98,019	114,211	13.93	100,075	300.22	131,673	152,966	250,053
% Item	48.10	52.94	57.02	8.88	52.69	158.1	61.35	65.51	76.49
% Item	51.90	47.06	42.98	-9.00	47.31	141.9	38.65	34.49	23.51
<b>Total</b>	100.00	100.00	100.00	—	100.00	300.0	100.00	100.00	100.00

rows and columns, define the relationships and T/Maker II will do the rest: it will perform the computations and formatting necessary to prepare your document. When you're finished you can analyze your report on your screen or store it on a diskette. Or, you can have the report printed with presentation quality.

And when any changes have to be made, simply enter the new figure or relationship and tell T/Maker II to adjust and recalculate all the new results.

**Editing capabilities.** As a full-screen editor for word processing, T/Maker II handles text up to 255 characters wide. It includes features like text formatting and justification, centered titles, a text buffer for block moves and repeated inserts, global search and replace commands for printing your letters, reports and documents. Wide documents are supported by horizontal scrolling.

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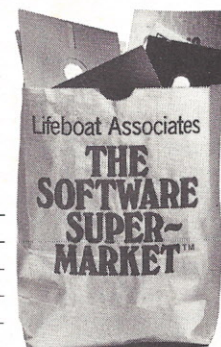
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744-10	1/SINGLE	HARD 10 SECTOR
744-16	1/SINGLE	HARD 16 SECTOR
745-0	2/DOUBLE	SOFT SECTOR
745-10	2/DOUBLE	HARD 10 SECTOR
745-16	2/DOUBLE	HARD 16 SECTOR

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and operating system, not BASIC, so it is much faster than others. Next, the chart of accounts is completely user-definable, with a range of text-formatting and editing features. And, using these formatting commands, anyone can generate one-time or permanent special reports in minutes. It has three types of comparison reporting: by budget period, year-to-date, and previous year. It also includes percentage calculations for each account or computation with one keystroke. It

produces supporting schedules to back up the reports, and prints anything on the video screen at any time with one command.

**Radio Shack General Ledger** has completely user-definable charts of accounts and account numbers. It prints balance sheets and P&L statements in seconds, and produces five other common reports, too. It automatically detects out-of-balance accounts, and has 16-digit accuracy. The package also follows automatic audit trails and has error-checking,

recovery and documentation routines. The manual is easy to understand, but its brown type and dark-brown reproduction on its sample video screen are hard to read and follow.

The TRS-80 G/L uses slightly different definitions for accounts than other G/L packages.

**Small Business Computer Systems, Inc.**, is projecting a significant change in mid-1981. It was originally based on the Osborne system, but its creators have made it com-

## GENERAL LEDGER CHART OF FEATURES

FEATURES/	AMERICAN BUSINESS SYSTEMS	BUSINESS ENHANCEMENT COMPUTERSERVICE	BPI SYSTEMS, INC.	COMPUMAX, INC.	COMPUTER PRODUCTS INTERNATIONAL, INC.	CROMEMCO, INC.	DESIGNER SOFTWARE	DURANGO	GRAHAM-DORIAN	INTERNATIONAL MICRO	NORTH STAR COMPUTERS	OHIO SCIENTIFIC, INC.	RETAIL SCIENCES	PRODIGY SYSTEMS	RADIO SHACK	SMALL BUSINESS COMPUTER SYSTEMS, INC. GROUP	STRUCTURED SYSTEMS	SYSTEMS PLUS	TARANTO & ASSOCIATES	VANDATA
Accounts:																				
a) Numbers Only	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
b) Alphanumeric							•			•										
Customized Acct. Numbers	•		•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Fixed Acct. Numbers		•		•	•															
Flexible Account Names	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Menu-Driven	•	•		•	•				•	•	•	•	•	•	•	•	•	•	•	•
Automatic Posting	•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Batch Processing			•				•			•	•			•		•		•	•	
Chart of Accounts	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Integration with other accounting software:	•		•	•			•	•	•				•		•	•	•	•	•	
a) Complete																				
b) Partial		•			•		•			•										
c) None										•	•									
Accounting Periods: Mth and Yr-to-Date	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Double-Entry	•		•		•		•	•	•		•	•	•	•	•	•	•	•	•	•
Audit Trails	•		•	•		•	•		•	•		•	•	•	•		•	•	•	•
Screen-Oriented						•				•		•	•				•	•	•	•
Consolidations		•					•			•		•	•			•	•			
Multiple Companies/Divisions	•					•			•				•			•		•	•	



# BETA COMPUTER DEVICES

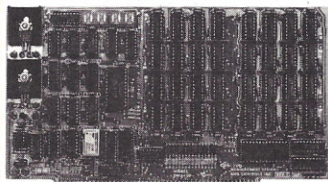
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- Switch select blinking or steady cursor

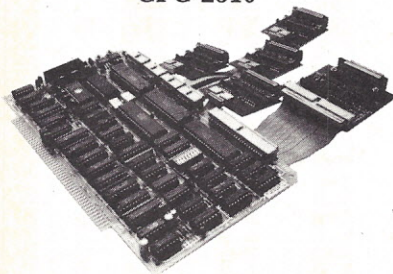
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|-------------------------|----------|
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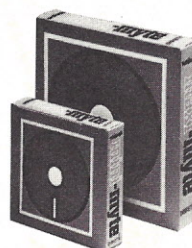
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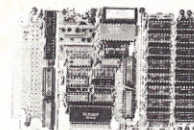
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## 6502 PRODUCTS

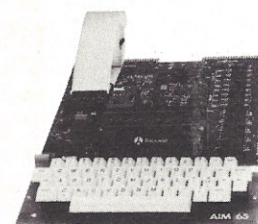


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| Professional AIM enclosure..... | 169.00   |
| Budget AIM enclosure.....       | 50.00    |
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pletely menu-driven and added a number of "user-friendly" features. It has dropped the Osborne manual and issued a manual much like those Personal Software issued for Visi-Calc. Company President David McFarling says the changes are based on studies of user questionnaires. SBCS has added some machine language to increase the program speed, and now brings the entire chart of accounts into RAM for transaction entry and posting. It also added

many error-checking routines, such as character-for-character checks, and it has rearranged menus, added submenus and included more user prompting on the video screens. The new manual also divides introductory material into blocks.

**Structured Systems General Ledger** is one of five integrated packages, and is aimed at multi-client CPA or accounting firms, or businesses with many profit centers, branches, divisions or departments.

It produces eight common reports and supporting schedules, and works through batch processing.

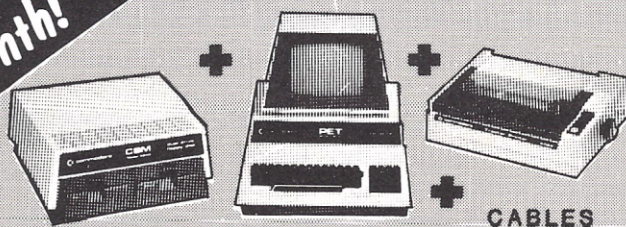
**Systems Plus AccountingPlusII General Ledger** includes fixed asset accounting, budgeting, previous year comparisons, a report writer, and a change-in-year condition report, as well as several common reports. Rather than using account editing to make corrections, it changes inaccurate entries with adjustment entries. It also goes

## GENERAL LEDGER CHART OF REPORTS

CHARTS/	AMERICAN BUSINESS SYSTEMS	BUSINESS ENHANCEMENT COMPUSERVICE	BPI SYSTEMS, INC.	COMPUMAX, INC.	COMPUTER PRODUCTS INTERNATIONAL, INC.	CRONMEMCO, INC.	DESIGNER SOFTWARE	DURANGO	GRAHAM-DORIAN	INTERNATIONAL MICRO	NORTH STAR COMPUTERS	OHIO SCIENTIFIC, INC.	RETAIL SCIENCES	PRODIGY SYSTEMS	RADIO SHACK	SMALL BUSINESS COMPUTER SYSTEMS, INC. GROUP	STRUCTURED SYSTEMS	SYSTEMS PLUS	TARANTO & ASSOCIATES	VANDATA
General Journal	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Balance Sheet	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Profit and Loss Statement	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Flexible Report Generators	•				•	•	•		•	•			•	•	•	•	•		•	
Trial Balances:			•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
a) Regular																				
b) Comparative	•	•			•		•													
Transaction Listing	•	•			•		•	•	•	•	•	•	•	•	•	•	•	•	•	•
Journals:																				
Cash Receipts			•		•	•				•	•	•	•		•			•	•	
Disbursements			•		•	•				•	•	•	•		•	•		•	•	
Merchandise			•																	
Cash Sales			•																	
Departmental Statements			•												•	•	•			
Statement of Change Worksheet		•									•					•				
Comparative Income Statement					•				•			•	•			•		•		
Edit List							•			•	•					•				
Supporting Schedules							•		•			•	•			•				
Multiple P&L Statements			•										•			•				
Payroll Ledger			•		•								•							
Accts. Rec. Ledger			•																	
Accts. Pay. Ledger			•																	
Multiple Division Consolidations	•												•			•			•	
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through heavy error-checking; for example, it confirms each order entry's part number and description before it accepts the entry. It integrates with the company's A/R and A/P packages only if they have been balanced previously. This package runs very quickly because it uses ISAM procedures. And the company is working on a new version which will increase the total number of transactions from 10,000 accounts, vendors, and customers *each* to more than 65,000 of each.

**Taranto & Associates General Ledger** is one of the oldest Osborne-based G/Ls on the market. It tracks accounts and transactions monthly, quarterly and annually, and can compare them to the previous year's report. It also allows up to nine departments. It integrates with A/R, A/P or other accounting packages from Taranto.

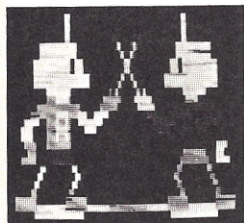
**VANDATA General Ledger** is another Osborne-based system that has been modified. It produces eight reports, including posting errors, and has a report generator. It keeps account totals for the current month, quarter and year, and the previous three quarters and year. This package is designed for small businesses, or accountants whose firms work mostly with small businesses. It also allows both direct posting and cash journal transactions.

These 20 G/L packages are only the tip of a growing iceberg of ever more powerful and capable general ledger and accounting packages. Software houses—both new and established—are modifying G/L concepts and procedures and adding more power, capacity and flexibility for comparatively little extra cost. It appears that any CPA in private practice or any business owner who wants to improve control over his financial affairs would do well to find an appropriate microcomputer-based G/L package or integrated system. 

## Vendor Guide

COMPANY	NAME/COST	CONFIGURATION/CAPACITY
American Business Systems 459 Littleton Rd. Westford, MA 01886	General Ledger \$700-900	Any 64k Z80 or Z8000 micro with Ryan McFarland COBOL and RIO, CP/M, OASIS, UNIX OR TI DX5 or 10 operating system, and two 8-inch floppies or hard disk. <b>CIRCLE 145</b>
Business Enhancement Compuservice 1711 E. Valley Pkwy. Escondido, CA 92027	Accounting III or IV—General Ledger set by dealers	32k PET or CBM 2001-8032, or 2040-4040. 900 accounts per diskette. <b>CIRCLE 146</b>
BPI Systems, Inc. 1600 West 38th St. Austin, TX 78731	General Ledger	48k Apple II or II Plus; two disk drives; AppleSoft; DOS 3.3; printer. Capacity set by disk. <b>CIRCLE 147</b>
COMPUMAX, Inc. P.O. Box 1139 Palo Alto, CA 94301	MICROLEDGER \$100 for Model I 200 for CP/M 150 for Apple	Versions for Apple 48k; CBM; CP/M and Microsoft BASIC; TRS-80 Models I and II; Sorcerer, Superbrain, Cromemco and Dynabyte. <b>CIRCLE 148</b>
Computer Products International, Inc. 3225 Danny Park Computer Plaza Building Metairie, LA 70002	General Ledger Cost N/A	Any 48k CP/M system with CBASIC, and two disk drives. Capacity limited to disk space. <b>CIRCLE 149</b>
Cromemco, Inc. 280 Bernardo Ave. Mountain View, CA 94040	General Ledger \$995	Runs on any Cromemco system with double-sided, double-density mini- or regular floppies. Capacity in the hundreds of accounts. <b>CIRCLE 150</b>
Designer Software 3400 Montrose Blvd. Houston, TX 77006	Palantir G/L \$850	Any 48k CP/M system with two disk drives or hard disk and Microsoft COBOL-80. Capacity depends on disk size. <b>CIRCLE 151</b>
Durango Consumer Computer Mktg. 55 Union Ave. Sudbury, MA 01776	General Ledger \$675, but total accounting package is only \$1,195.	Durango BASIC, DOS and hardware with software from MicroCOBOL. <b>CIRCLE 152</b>
Graham-Dorian 211 North Broadway Wichita, KS 67202	General Ledger \$595	48k CP/M with two floppy disk drives. Up to 200 accounts and 2,500 transactions on one eight-inch floppy. <b>CIRCLE 153</b>
International Micro Systems, Inc. 8425 Quivira Rd. Lenexa, KS 66215	General Ledger \$795	48k CP/M or MP/M systems with dual floppies or hard disk and CBASIC 2. 500k recommended. <b>CIRCLE 154</b>
North Star Computers 1440 Fourth St. Berkeley, CA 94710	ACCPAC Gen. Ledger Cost N/A	North Star Horizon, 48k, dual floppies or hard disk. Up to 900 accounts <b>CIRCLE 155</b>
Ohio Scientific, Inc. 1333 S. Chillicothe Aurora, OH 44544	General Ledger OSI DBMS \$195	OSI Challenger C4P or C3 series, 48k, dual floppies or hard disk. Capacity set by disk size and density. <b>CIRCLE 156</b>
Retail Sciences Peachtree Software Three Corporate Square Atlanta, GA 30329	Peachtree Software General Ledger \$495-695	Any Z80 system with CP/M, 48k and dual floppies, or Apple II Plus with Microsoft Z80 SoftCard with two mini-floppy drives. Up to several hundred accounts. <b>CIRCLE 157</b>
Prodigy Systems 497 Lincoln Highway Iselin, NJ 08830	PROTEGE General Ledger \$750	Only runs on Prodigy's PROTEGE hardware and software. Up to 1.25 Mb in single density per drive and 2.5 Mb in two drives. <b>CIRCLE 158</b>
Radio Shack One Tandy Center Fort Worth, TX 77062	General Ledger \$399	64k TRS-80 Model II with two floppy disks and 132-column printer. Up to 3,072 transactions per month and 504 accounts. <b>CIRCLE 159</b>
Small Business Computer Systems, Inc. 4140 Greenwood Lincoln, NE 68504	General Ledger \$249; new enhanced version is \$349.	48k Apple II or II Plus, dual disk drives or hard disk; 110-col. printer; and DOS 3.2 or 3.3. Capacity relates to number of accounts and transactions. <b>CIRCLE 160</b>
Structured Systems Group 5204 Claremont Oakland, CA 94618	General Ledger \$595-695 sugg. dealer price	Any 8080- or Z80-based, with 52k RAM, with CP/M dual floppies; 132-column printer. 200 to 500, or more, accounts. <b>CIRCLE 161</b>
Systems Plus 3975 East Bayshore Palo Alto, CA 94303	AccountingPlus II General Ledger \$425	Apple II Plus or II with firmware card, 48k, dual drives, and 80- or 132-col. printer. Also Corvus hard disk. Up to 500 accounts. <b>CIRCLE 162</b>
Taranto & Associates P.O. Box 6073 San Rafael, CA 94903	General Ledger/ Cash Journal \$495-695	TRS-80 Model II, 64k, two disk drives, 132-col. printer with up to 1,000 accounts and 7,000 transactions. (Osborne-based system) <b>CIRCLE 163</b>
VANDATA 17541 Stone Ave. North Seattle, WA 98133	General Ledger/ Cash Journal \$295	Any 8080, 8085, or Z80 system with 48k; one double-density floppy or three mini-floppies for the best results; 132-col. printer; and CP/M and CBASIC 2 Version 2.5 or later. <b>CIRCLE 164</b>





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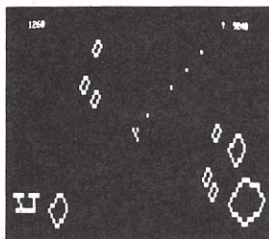
**FLIGHT SIMULATION**

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**SUPER NOVA**

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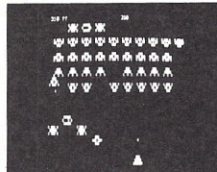
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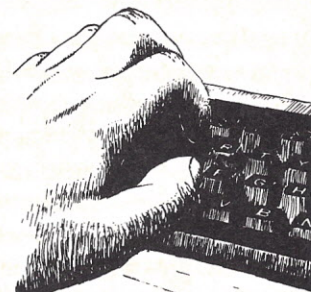
**PINBALL**

By John Allen from Acorn  
Get your flipper fingers ready for action in this real-time, machine language game.

Lots of sound and flashing graphics make this fast action game so much like the real thing that you'll have to remind yourself not to shake your TRS-80. Choose from five playing speeds to match your skill. Can you beat your friends' scores? Will you avoid the dreaded "Bermuda Square?" Get PINBALL today and find out.

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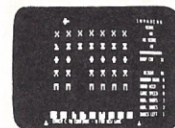
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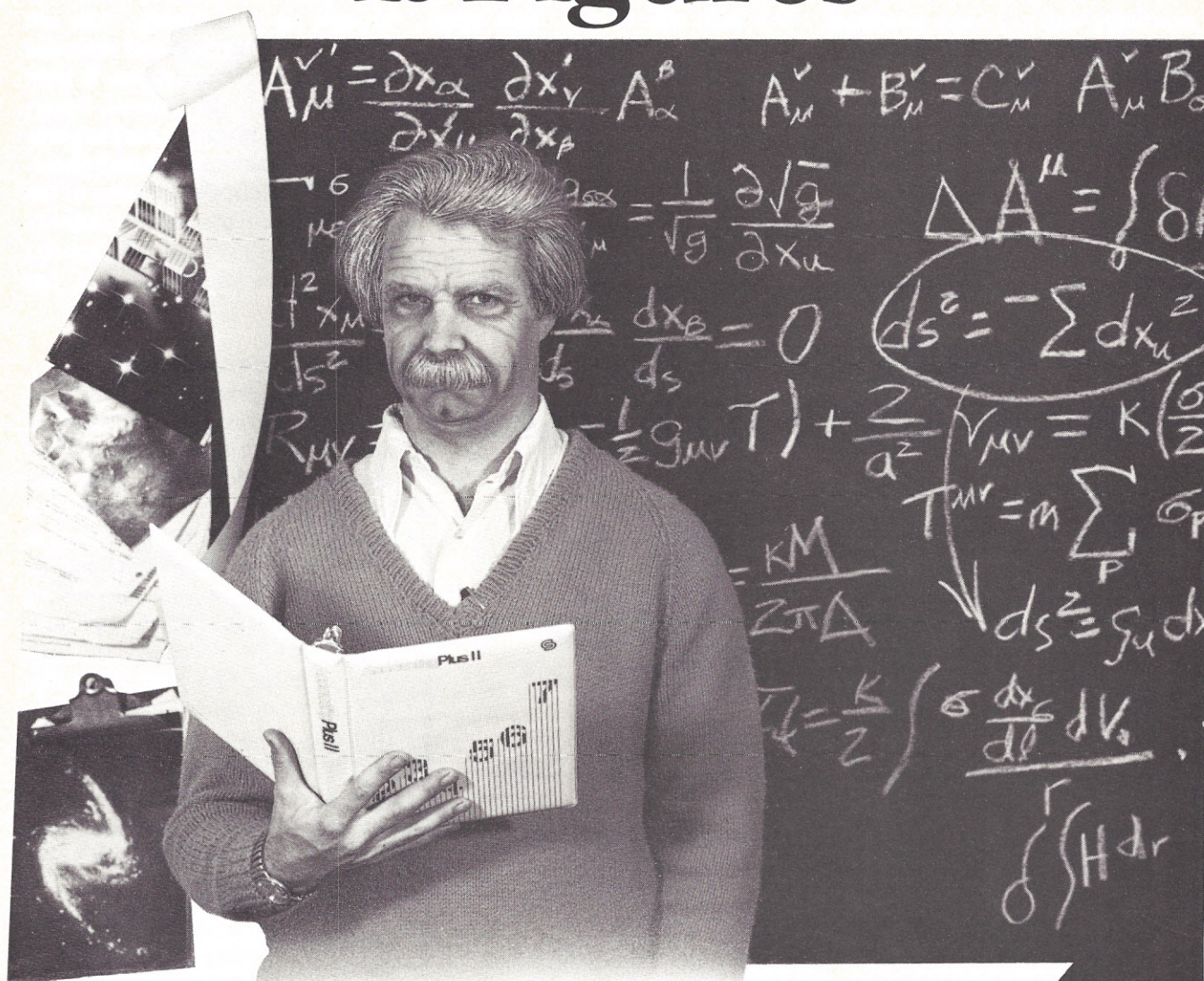
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\*TM of Software Dimensions, San Jose, CA

\*\*TM of Apple Computers, Cupertino, CA



## Consciousness-Raising

continued from page 24

new piece of music; you play the software package and you keep practicing with it. I was a greenhorn when I started—I really had to struggle at the keyboard.”

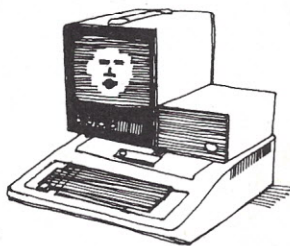
Heltman contends that computing changed the way he thinks in that he's been able to use “both hemispheres of my brain and maybe grow the right one a bit.”

“For most of us in Western culture, especially little boys, we were brought up traditionally. The left hemisphere is stroked and rewarded and our educational system is built around it. It is the rational, linear-thinking, logical, safekeeping, numeric functioning hemisphere. The right hemisphere is more of the musical, face-remembering, holistic-thinking, seeing-it-all hemisphere, which is not as rewarded in our culture.”

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### Creating cockroaches

It is the interaction between these two hemispheres and the full utilization of them that allows the highest creativity, productivity, and best overall thinking. If you can involve your right hemisphere a little more in your thought processes, you may be able to see a more whole picture, so that when you start down some logical path, you're working on the right premise in the first place. “It's like Kafka's *Metamorphosis*,” says Heltman. “If you assume a boy can change into a cockroach, you can write a very logical story about what happens because of that. By being holistic in your thinking, you avoid dumb assumptions.”

“And when you see you have the capability of doing a lot of tasks via the computer, you have to drop back and become more holistic. You ask what the overall effect of having this capability is in the way you get a job done, or run the office or work as a team.”

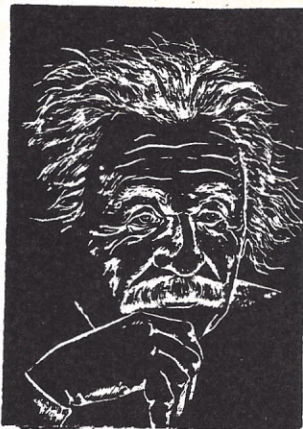
### Teaching thinking

The ways in which personal computing changes thinking—be it more holistic, more creative, more logical, or more organized—are witnessed daily by John M. Nevinson Associates, a Concord, MA, firm that deals with management consulting on computing. Owner Jack Nevinson

continued on page 91



# An Intelligent Alternative



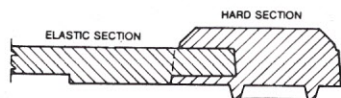
TYPRINTER 221

In the research you are doing before purchasing your computer printer, you are probably confused by the various claims, speeds, choices, shapes and prices. Well, we'd like to clear the air a bit and tell you about the most unusual computer-printer around — the TYPRINTER 221.

You see, it's unusual because it is **totally compatible** with **every** computer and word processing program... from the largest to the smallest. It's versatile to the point of incredibility... We'll discuss the broad advantages and explain the details.

## THE DAISY WHEEL

The special daisy wheel supplied is of a unique design consisting of a 100 character carrying radii. Each radii is formed of two distinct types of plastic — an "elastic plastic" for the stalk of the radii, and a comparatively "hard plastic" used to form the character area. This, combined with a very narrow character profile and a special positioner on each of the 100 radii, guarantees a uniform character density. There is near perfect geometric positioning of the character with no character higher or lower than the others. And because of its unique dual material design, micro-vibrations have virtually been eliminated, leaving your final copy clean, clear and smudge free. The copy produced is comparable to that produced by metal daisy wheels and at a fraction of the cost.



## THE KEYBOARD

The keyboard has been referred to as a triumph of human engineering — from the way the keys seem to have been custom designed to fit your fingers, to the way the special feature switches have been grouped. A flip of a switch (or under computer control of course) and the printer becomes a foreign language machine. Push a button, and like magic the printer automatically locates and lines up columns of figures, perfectly balanced between the margins. This incredibly fast, extraordinarily quiet electronic keyboard puts more programming power at your fingertips than printers costing five to ten times as much.

## THE DISPLAY

The TYPRINTER 221 presents a new dimension in operator/machine communications. In the manual (typewriter) mode, the printer controls and verifies all entries before printing. The display exhibits the last 15 characters of the text, word-by-word, until the end of the line. The operator may control what will be printed before the actual printing takes place. This new found flexibility enables you to make modifications along the entire line and in both directions. This 20 character plasma display has the ability to scroll backwards as well as forwards; will give the operator a visual indication as to which print mode is currently being selected as well as the number of characters remaining before the right margin is reached. The display will also indicate to the operator:

The number of characters available in the memory.

When the printer is in an error condition.

When a pre programmed form lay out has been selected.

When the printer is operating from the internal memory.

What characters will be inserted into an existing text.

When the memory for the previous line has been selected.

A warning message that the end of the page is being approached.

That a hyphenation decision must be made.

## PRINT MODE

The TYPRINTER 221 will allow you to automatically highlight individual characters, words or complete sentences. Whatever is entered from the keyboard or from the computer, even an existing text file, can be printed in one or more of the five different modes:

traditional printing;

underlined characters;

true bold characters where the horizontal component of the character is increased without disturbing the vertical component;

characters which are both bold and underlined, and;

a feature unique among computer printers — printing in reverse — white on black, sort of reverse video on paper.

## MULTILINGUAL CAPABILITY

A unique and useful feature of the TYPRINTER 221 is its capability of being able to print in several languages without changing the daisy wheel. In addition to English, every standard daisy wheel has the ability and the necessary characters to print in French, Spanish, Italian and German.

## THE FEATURES

### Automatic justification of the right margin

The electronics of the TYPRINTER 221 have made right hand justification a simple, automatic operation.

### Phrase and format storage

Phrases, dates, addresses, data, etc. that may be stored in your computer's memory may be sent over to the printer and stored in one of the "memory bins" of the printer. This information may then be used by the operator in the manual mode. This can save you hours when trying to get a form "just right."

### Automatic centering

The TYPRINTER 221 will not only center any title between the pre-set margins, but will also center over one or more columns, or over any specific point and will even align copy with the right margin independent of the left margin.

### Automatic vertical lines

A command from the computer enables an automatic feature which prints vertical lines at any point on the paper.

### Automatic tab sequence recall

With the TYPRINTER 221 you may store and recall the most frequently needed margin and tab sequences for applications such as daily correspondence, statistical reports, etc. This guarantees consistent high quality appearance of each document.

### Paragraph indent

A computer command instantly sets a temporary margin in order to print one or more indented paragraphs with respect to the right margin.

### Automatic decimal point location

No matter how many figures to either the left or right of the decimal point, the TYPRINTER 221 will automatically line up the figures with the decimal point in any position you choose. Statistical printing has never been easier.

### Column layout

This feature allows you to obtain automatic and perfect distribution of spaces between columns in respect to the margins. A perfect page balance is assured without the need to carry out calculations or additional operations.

**There is a wide variety of options that you can add to TYPRINTER 221.**

By now you are probably convinced that we are sold on our machine, and we hope you can understand why. In fact, why don't you use these facts to measure against any and/or all the other computer printers on the market.

When you do, you will realize the TYPRINTER 221 is an intelligent electronic typewriter, a text formatter — and a brilliant computer printer — available at a suggested list price of only \$2850.

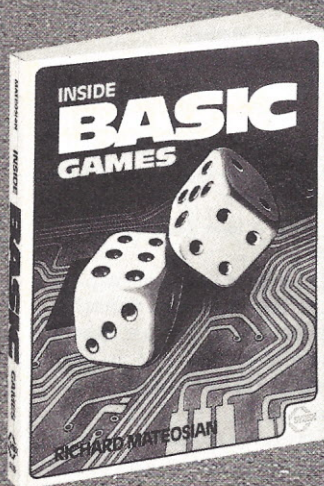
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# SYBEX HAS THE BASIC IDEA

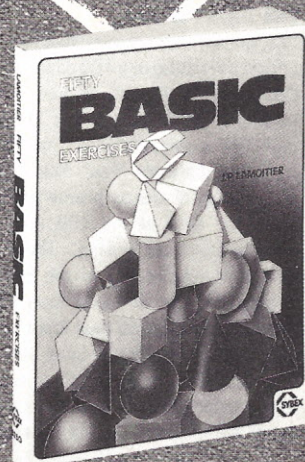


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CIRCLE 45



continued from page 88

teaches a course called "executive computing," which trains executives to integrate computer calculation and human judgment.

Nevinson says, "There isn't a person who has worked with computers for more than three hours who hasn't learned a new kind of humility about just how feeble our little brains are. But the part of your head that deals with sequential, analytical problem-solving is strongly reinforced through activity of computer programming."

How does this happen? "The computer is nothing but the perfect pupil. It's perfectly stupid, perfectly attentive, perfectly patient. It does no more than you tell it to do. It does no less than you tell it to do. And it has a perfect memory."

Because of this perfect pupil, a computer newcomer may step back

after awhile and wonder why, for example, he knows financial modeling like he never knew it before. In Nevinson's view, the reason relates to the old rule: "The way to learn something is to teach it. That's precisely what's happening here. You're learning something like you never learned it before because you have to teach it to the perfect pupil."

Nevinson does not see computing changing basic thinking patterns; rather, he sees it as a means of highlighting what one has known all along. "Computing reinforces in a phenomenal way—by catching and holding your reasoning at each step of the way. It allows you to build structures that are 10 to 100 times the kind of structure you can build without it."

Not only that, but you can make money at it as well. John Bratley has

been a stockbroker for Dean Witter Reynolds since 1934. The market used to close when brokerage houses had to catch up on all that paperwork. But since some of these houses, including Dean Witter, have computerized, all transaction processes have been speeded up. "It was no big adjustment. I had no problem adapting. I just get fast news and quick quotes from it."

With ease, Bratley did what GE's Heltman advises: "Get the hell at it and do it. You'll never lose your investment . . . it's like the resale of a Volkswagen. But you can't be damp and you can't be dry. Get wet. And once you're wet, get wetter. You'll find that there's a host of people to get wet with."

(Editor's note: Dr. James L. Adams tells you how to get wet on page 92.)

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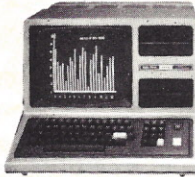
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CIRCLE 47

## Adapting to Computing

*Editor's note: Dr. James L. Adams is a well-known lecturer and author of Conceptual Blockbusting—A Guide to Better Ideas. Associate dean of academic affairs at the School of Engineering at Stanford, Adams holds some powerful ideas on the adaptability of people to personal computers.*

*Lee The, Personal Computing's field editor, spoke to Dr. Adams regarding the behavioral changes involved in acclimating oneself to the use of microcomputers.*

**PC:** Imagine the following scenario: A marketing executive has purchased a personal computer. Following his usual routine, he tries to process information the way he's always done it manually, but he

can't. We're interested in hearing your views on (1) what this executive has to do to adapt to the computer; and (2) why should he?

**ADAMS:** Let me deal with your second question first. It's important that this executive adapt because the interaction of professional people with computers is inevitable. It's happening already. Professionals pay a high price in time and money when they avoid computers. And in the near future—certainly within 10 years—it will become too high a price for anyone to pay. It's not a question of "whether," it's a question of "when."

Now, for your first question. How do you change? Changing from manual operations to an interactive personal computer is difficult for at least three major reasons: problem-solving habits, established pro-

cedures, and fear of being perceived as incompetent.

In asking that a person learn to use a computer, you're really asking him to change his problem-solving habits. And *problem-solving habits* are a great deal more difficult to change than, say, tennis-playing habits. There aren't any problem-solving coaches, or problem-solving ranches.

**PC:** It's more threatening, then?

**ADAMS:** Yes, it is. You have to change your perception of the alternative you have for solving problems. And people rely heavily on perceptual models for thinking. So you have to change the way you view your problems, your thinking process, and your actions.

Adapting to a computer also means new tricks, and that takes

*continued on page 95*



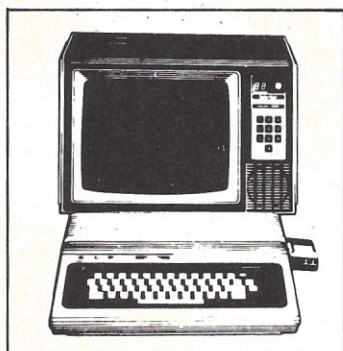
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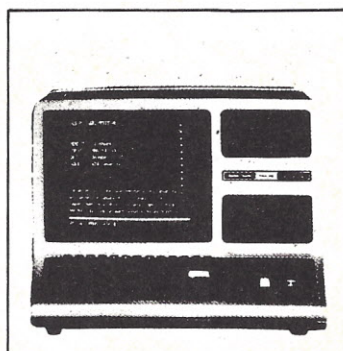
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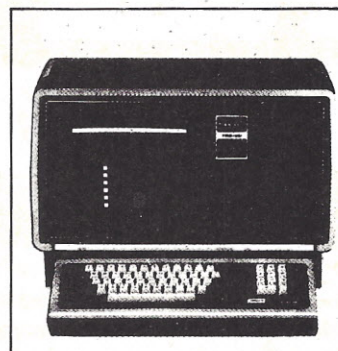
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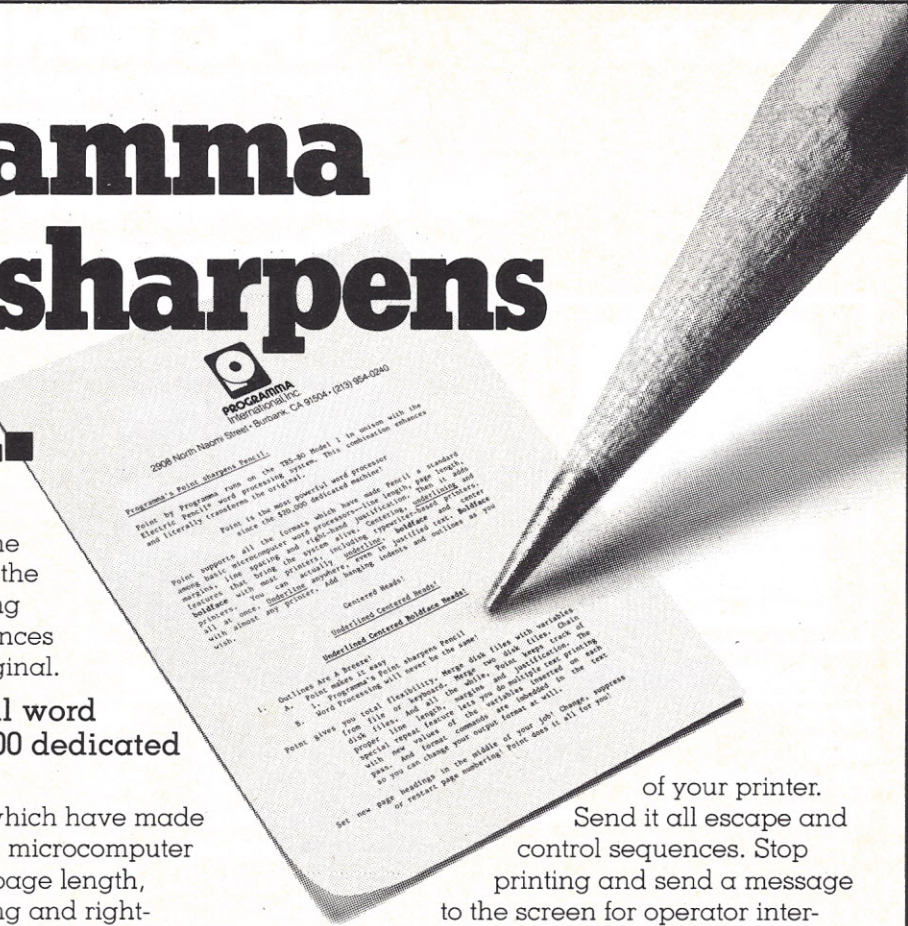
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time and energy. People who are fairly well settled in their professions are used to using *established procedures* to solve problems.

But the biggest stumbling block to learning to use computers is an emotional one. Entering an area where you're relatively less expert provokes a *fear* of not being as good as you'd like people to think you are.

These problems are even more difficult to overcome in established professionals, because *expertise in computers is almost inverse to age*. Our present students—although they may not be experts in programming—certainly have a fantastic attitude toward computers. They are completely comfortable with them. But it's immensely difficult for people who are experts in other fields to enter a new field and start again as an amateur.

PC: I know what you mean. I'm

taking Afro-Brazilian dance right now.

**ADAMS:** Exactly. And it would be even more difficult for you if that course were directly related to your income, or your job, or your image. It's difficult for you to do, but you can at least classify it as a hobby or a sideline.

To illustrate this point, let me tell you about something unique that Stanford did recently. The engineering school gave away a hundred TRS-80s to faculty members. As far as I know, it's the first thing we ever gave away. We did this because we had a large number of dazzled professionals who were operating through a large central mainframe facility. A lot of them were operating through the students—graduate students.

A bunch of us suddenly became sensitive to the fact that a lot of the

faculty did not have personal experience with personal computers. And we could not find anybody to train them, or a training program, or anything that suggested a comfortable way to get people acquainted with them.

We found that if someone acquires a personal computer, it is easier for him to become familiar with computing. This is partly because it solves the emotional problem, since people can take them home and they don't have to learn a new trick with a lot of people watching who know it better. If you ask an established professional—an established faculty member—to come into the undergraduate terminal room and sit down and start interacting with the machine, you're asking an awful lot.

PC: So it's paying attention to the user's dignity that counts?

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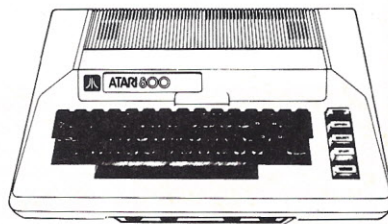
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**ADAMS:** That's right. It's also paying attention to the learning process. We found that this was amazingly successful. There was only one catch. People had to demonstrate within three months that they had managed to use the personal computers in either their teaching or their research.

**PC:** In order to keep their computers?

**ADAMS:** Yes. That wasn't asking a whole lot. They have all kept them. And it resulted in a tremendous change in a lot of people's computing habits.

I don't have study results to refer to on this, but I can give you some comments. First of all, a lot of people have been willing to give up what I'll call "computing power" in return for possession of the machine. In other words, they have been able

to sacrifice a large amount of speed and capacity in order to have a machine that was all theirs, available at any time.

Secondly, one reason we gave away these computers was that many people became sensitive to good programming versus bad programming. When you have to live within a finite number of bytes, you tend to become more knowledgeable about what sufficiency is. When you use large mainframe machines it's less apparent. I think people are learning more about good programming via the use of personal computers.

Another thing that happens when people get their own computers is that they become more innovative with the machines. Our faculty members are starting to think more about their classroom assignments and in what phases of teaching they


can use computers. With some people there's definitely an over-reaction. They become computer zealots for awhile, until they settle down to normal again.

**PC:** Getting back to problem-solving, how do you go about changing habits and overcoming emotions in working with computers?

**ADAMS:** The emotional problem with changing people's habits is dealt with in one of two ways: personally, or from a corporate standpoint. The first approach involves a reward system, which makes it more comfortable for people who venture onto new ground. This can be done by making the venture beneficial to the user. So when people buy themselves a Radio Shack, Apple, or a Pet—it's an instant incentive to learn.

Feedback is the other way people's

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habits can be changed. It's important to let people know that they are in fact accomplishing things. That's built into the manuals for some of these machines. So, once you get your hands on a small computer the problem is well-nigh solved.

One of the problems is that people will build incredibly elaborate rationales as to why they don't purchase a personal computer. These range all the way from money—and I that's obviously an irrational argument for professionals—to things like "Well, I hire people to do that kind of work," or "I operate more in an idea realm." There are very elaborate arguments people use to initially avoid getting a personal computer. But I really think that the way to solve all of these problems is to somehow get a hold of a machine to take home and play with.

One of the reasons we insisted that our faculty prove they were using the TRS-80s within a certain amount of time is to insure that even after people have a personal computer they will continue to work with it until they're getting pleasure out of using the machine. It is more difficult than most people think to get established professionals on a computer. If you can get them committed to putting in the time on microcomputer, then they're on the way to solving their computer-related emotional hang-ups. One interesting aspect is that the longer people avoid learning to use computers, the more difficult it is to adapt.

**PC:** What about the people who say: "Well, I hear there's going to be some really good software and some real price breaks a year or two from now... I think I'll wait until then?"

**ADAMS:** I think whenever you jump into this game you shouldn't worry about doing it at the optimum time—just do it! To a professional engineer, or to someone who is around a lot of computing—buying a basic personal computer is really an education. That's probably not going to be the ultimate solution to computing for that person—I'm just talking about engineers. Because presumably they will end up with something with a little more power and expandability. For some people, an Apple may be the best solution. In fact, it may be for most people. The point is, there will always be more sophistication, better software, and lower prices. But the true price—in time, efficiency, and ease of learning—will increase for each year you put off your purchase.

**PC:** Is there any particular software

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**CIRCLE 54**

Personal Computing/August 1981

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that you would recommend for someone who has just purchased his first computer?

**ADAMS:** As little as possible. I think it's very important when you first get a personal computer that you program it personally. You're going to understand its capabilities a lot better that way, and you'll lose a lot of your fear of it. In fact, that's what most instruction books do for you—walk you through the process.

**PC:** In the industry they talk so much about developing user-friendly machines—those that are easily grasped by people unfamiliar with computers. What you're saying contradicts this trend.

**ADAMS:** But what we're talking about is what you have to do to hurdle that psychological barrier toward using a personal computer. Once again, I'm talking from a different

background—a semi-quantitative background—but to me there's tremendous importance in getting people to realize that a computer is, although complex, a non-magical device. At which point, sure, the more user-friendly software the better. What I suggest may not be the quick path to getting the most out of computation in an organization or an individual. But I think it's the quick path to getting over the psychological problems that people have with computers. You find out that you too can rapidly learn to program a computer, at which point you should realize that you're not an expert at programming, and just use what you've learned as general knowledge.


**PC:** What would you like to say in closing to the professional reading this article?

**ADAMS:** If you don't have a personal computer, get one immediately.

**PC:** That's pretty straightforward.

**ADAMS:** I think for most professionals the investment in a basic personal computer is very minimal, because not only do you get a chance to enter a whole different area of professional accomplishment but you get all the fringe benefits—such as your kids playing with it. It makes you "in" on your block.

**PC:** Would you make the same recommendation for a non-quantitatively oriented professional such as a lawyer, a doctor, or a marketing executive in a national corporation?

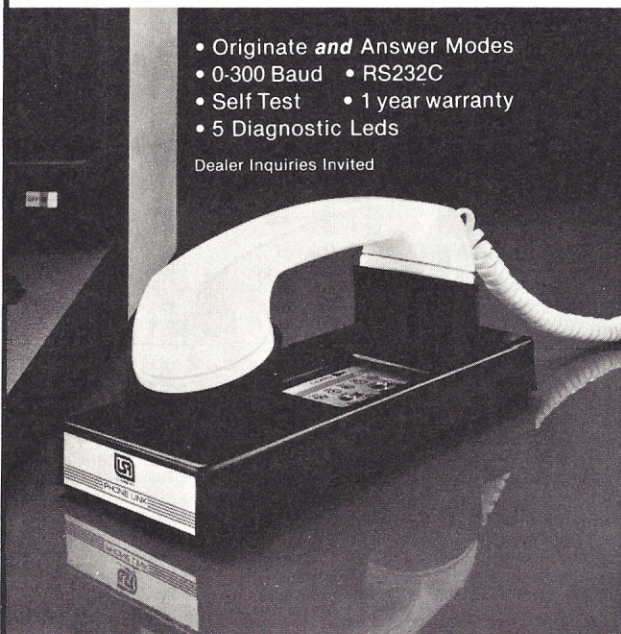
**ADAMS:** Yes. I would. I'd make that statement for any executive in a field where the use of computers is increasing. If you're in a field where the use of computers is increasing, you'd better get one. 

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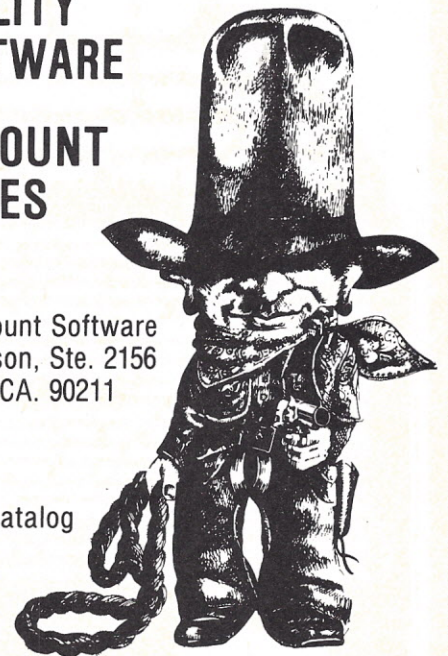
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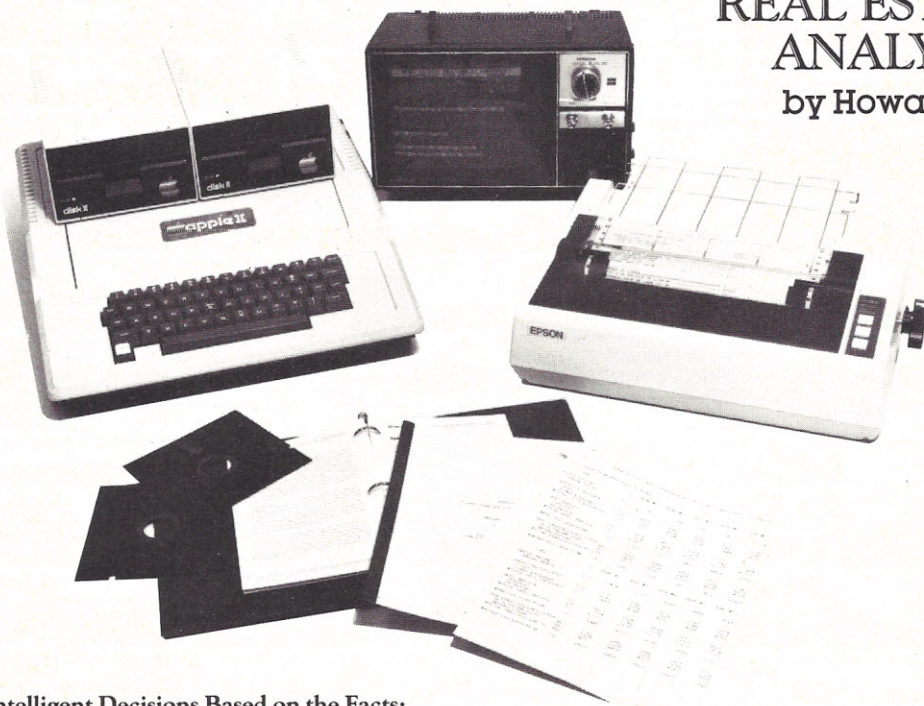
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## Some Japanese Personal Computers

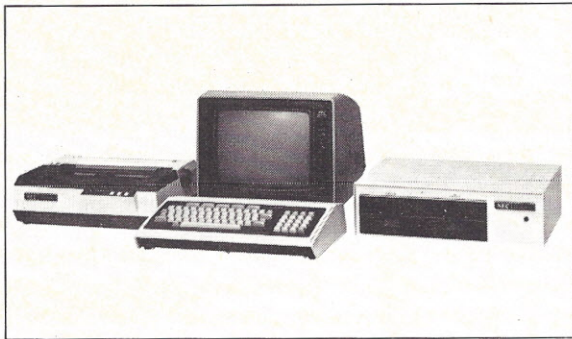
MANUFACTURER	MODEL	DISPLAY & FORMAT	MEMORY	CPU	PRICE (in yen)*	AVAILABILITY
AE Electronics	ABC 24	12" CRT, 80 x 24 display, monochrome	64k RAM, 4k ROM	Z80A (8 bit)	1,380,000 (ABC 24)	worldwide
Ando Electric	AE8101	9" CRT, 40 x 16 display, monochrome	64k RAM, 4k ROM	Z80 (8 bit)	1,020,000	Japan only
Anritsu	Packet 68000	9.5" CRT, 64 x 21 display, monochrome	128k RAM	68000	1,500,000	Japan only
Canon	BX-3	single line dot matrix, 28 x 1 (optional)	32k RAM, 32k ROM	6809	1,480,000	worldwide
	CX-1	12" CRT, 80 x 24 display, monochrome	32k RAM, 32k ROM	6809	1,380,000	worldwide
Casio	FX9000P	5.5" CRT, 32 x 16 display, 256 x 128 graphics	32k RAM, 12k ROM CMOS optional	Z80 Z (8 bit)	149,000	Japan only
CEC Chuo Electronics	CEC 500	12" CRT, 80 x 24 display, monochrome	64k RAM, 24k ROM	Z80A (8 bit)	1,560,000	worldwide
Densan, Co., Ltd.	DSC-80ZA	terminal dependant	4k RAM, 8-32k ROM	Z80A or 8088 (8 bit)	2,150,000	worldwide
Ebrains, Inc.	Ebrain 80 System 1	controller or terminal dependant	user definable, 8-64k RAM, 8k ROM	Z80 or 8085 (8 bit)	700,000 (System 1)	Japan only
Fujitsu Micro	Micro-8	12" color CRT, 80 x 25 display, 640 x 200 graphics	64k RAM, 32k ROM (both expandable)	dual 6809, Z80 optional (8 bit)	218,000	Japan only
Hitachi	MB6890	optional 12" color or monochrome CRT, 640 x 200 graphics	64k RAM, 28k ROM	6809 (8 bit)	298,000	Japan only
Matsushita	MYBRAIN 850M	12" CRT, 80 x 24 display, monochrome	56k RAM, 2k ROM	8085 A-2 (8 bit)	2,400,000	worldwide
Mitsubishi	Business Computer	12" color CRT, 80 x 24 display, 640 x 400 graphics	256k RAM, 8k ROM	8086 (16 bit)	1,000,000	Japan only (April 1982)
NEC	PC-8001	optional 12" color or monochrome CRT, 80 x 25 or 80 x 20 display, 160 x 100 graphics	16k RAM, 24k ROM, (both expandable to 32k)	Z80A	168,000	worldwide
Oki	IF 800 Model 10,20	12" CRT, 80 x 24 color display, 640 x 200 graphics	48k RAM, 8k ROM, (both expandable to 64k)	Z80A	1,280,000	worldwide
Sanyo	MBC 3000	12" CRT, monochrome, 80 x 24 display graphics	64k RAM, 4k ROM	dual 8085A	1,680,000 (3000) 998,000 (2000)	Japan only
Seiko	9500	14" CRT, 80 x 24 graphics	256k RAM 8k ROM	(16 bit)	3,000,000	Japan only
Sharp	MZ80B	9" CRT, monochrome 80 or 40 x 25 display, 320 x 200 graphics	32k RAM, 2k ROM	Z80A	278,000	worldwide
SORD	M20/23	optional 12" CRT, 80 x 25 display	16k RAM, 20k ROM	Z80A	198,000 (M20) 258,000 (M23)	Japan only
TEAC	PS-85	9" CRT, monochrome, 64 x 16 display, 640 x 400 graphics	48k RAM, 13k ROM	Z80 A	800,000	Japan only
Teijin	TDC-8100	9" CRT, monochrome 40 x 21 display, 200 x 240 graphics	61k RAM, 4k ROM	Z80A	1,470,000	Japan only
Toshiba	BP-100	9" CRT, monochrome, 40 x 13 display	48k RAM, 16k ROM	N/A	1,470,000	Japan, Asia
Toyo Tlesonics	AVC-777	5.5" CRT, monochrome 80 x 24, 72 x 24, or 40 x 24 display, 340 x 200 graphics	64k RAM, 2k ROM	Z80A	930,000	Japan only

\*At press time, 220 yen = \$1(U.S.) Price does not include shipping.



*continued from page 17*

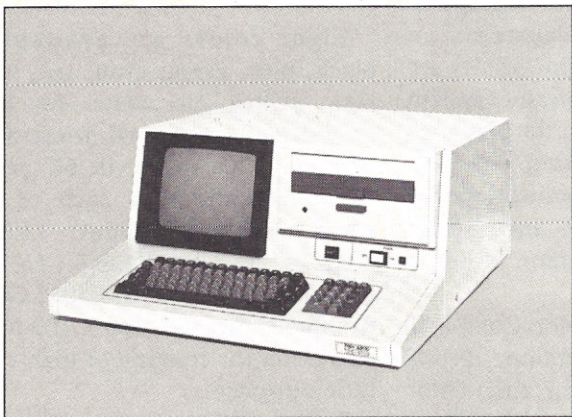
system will include a very high-resolution monochrome display with 640 horizontal points and 400 vertical points. Able to run under the CP/M operating system, the computer will also have BASIC, FORTRAN and COBOL available



NEC PC-8001

for the user. The system will include two mini-floppy disk drives.

Many other companies are also using 16-bit processors to get high performance in small-system packages. For example, the C-18 from National uses a 16-bit microprocessor designed by its mother company Matsushita (the MN 1610) and also offers built-in dual mini-floppies, a 12-inch CRT that



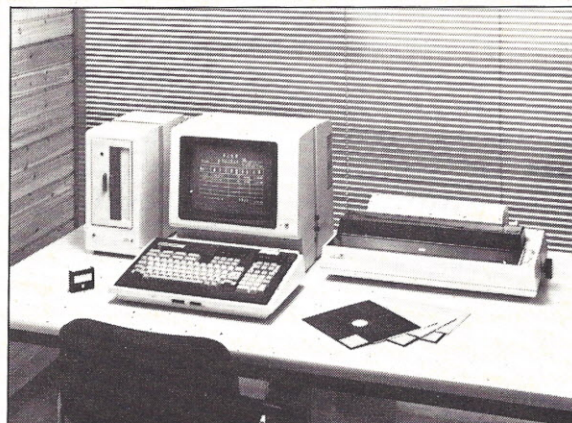
Teijin's TDC-8100: 9" CRT, 61k RAM, 4k ROM.

handles an 80 x 24 character display, a dual-mode keyboard, and 124 kbytes of useable memory space. Optionally available are 8-inch floppy drives, a high-performance dot-matrix printer, and letter-quality printers. IEEE-488 parallel port and two RS-232 serial ports are optional interfaces for the system.

From Panafacom comes the C-180, which the company calls a "cell computer". This computer is the same as the National C-18, but is aimed at network applications—it can work as a stand-alone

system, as a subsystem controller, or as a smart terminal in a large network.


Trying to set the standard in large microcomputer systems, CEC Chuo Electronics unveiled its CEC 8000 superbase system. The CEC 8000 takes advantage of a Z8001 16-bit microprocessor and offers an addressing capability of up to 8 megabytes. The Superbase system consists of a CRT and dual 8-inch floppy disk assembly, a moveable keyboard assembly and a stand that can house a hard-disk drive with up to 40 megabytes of storage capacity. Not only does the system hard-



Bubcom 80: 160 x 100 dot graphics capability

ware offer many powerful features, but the system software has been adopted from the popular Western Electric UNIX operating system, or if Pascal is preferred, from the UCSD Pascal operating system. BASIC, FORTRAN, and machine assembly can also run on the system.

CEC Chuo also offers two smaller systems—the CEC 500 and the CEC 800, both of which are based on 8-bit processors. The CEC 800 looks very similar to the high-end system, but doesn't offer as much software capability or memory-addressing range. However, a multiprocessing system can be put together by using multiple CPU boards. Both the CEC 800 and CEC 500 systems can use the CP/M-compatible operating systems.

Strictly aimed at the Japanese market, the BP-100 all-in-one system from Toshiba was designed for full Kanji data entry and processing. The system keyboard consists of 100 main keys and an overlay selection-control keypad, permitting several thousand words to be routinely input. The system hardware consists of a 9-inch CRT capable of displaying 13 lines of 40 characters, two mini-floppy disk drives, and a high-resolution printer. The system includes BASIC as the language. Extension options are also available. 



## HARDWARE UPDATE

# Commodore Introduces Two New Computers

Two new computers have been added to the Commodore line: Micro-Mainframe, which combines the power and languages of mainframe systems with the low cost of microcomputers, and the CBM 8032 Color Computer, a color version of the CBM 8032 microcomputer.

The Micro-Mainframe which also is based on the standard CMB 8032, features an integrated green phosphor 12-inch (80 x 25) display and 73-key typewriter style keyboard. The keyboard offers standard upper/lowercase, numeric keypad and full cursor control



The Micro-Mainframe features a 12-inch green phosphor display and a 73-key keyboard.

Commodore International has built this computer as a pseudo 16-bit 6809-based system with 36k ROM, 96k user RAM and 2k screen RAM (134k total). The system supports all current CBM peripherals except the CN2 cassette recorder.

An extensive software package for the Micro-Mainframe has been developed by Waterloo Computing Systems to meet the requirements of the University of Waterloo in Ontario. This portable software is par-

ticularly suited to microcomputers, but identical versions are available on medium and large-scale systems.

Micro-Mainframe currently supports Waterloo microBASIC, Waterloo microPascal, Waterloo microFORTRAN, and Waterloo microAPL. COBOL is under development at this time.

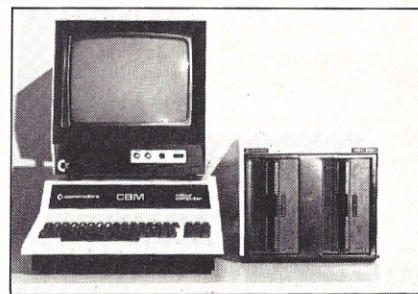
The computer allows the generation, testing, editing and debugging of program source files in the interpretive mode. These files can then be executed on the Micro-Mainframe or transmitted and executed on a mainframe system, using the same language interpreters.

The company says the computer can operate as a standalone system with the variety of business software available; as a mainframe system development tool with the available languages and up-load/off-load capabilities; and in education for training in languages and system design. Micro-Mainframe sells for \$1995.

The CBM 8032 Color Computer contains a high-resolution, direct-drive RGB (red, green, blue) color monitor that provides crisp display in both text (80 x 25) and graphic modes. Users can run all software developed for the standard CBM 8032 on the color computer without modification, Commodore says.

Normally the CBM 8032 Color Computer displays green characters on a black background. Using the CONTROL key, the user can then display information on the screen with a variety of foreground and background color combinations, as

well as reverse field for highlighting. Color displays can be generated on a character-by-character basis, either directly by the user or under program control from within a single print statement.



There are eight foreground and background colors available on the CBM 8032 Color Computer.

Eight colors are available—black, blue, green, cyan, red, magenta, yellow and white—for both background color and foreground display. The result is 64 possible combinations in each of the three character modes: TEXT, GRAPHIC and PLOT. In the graphic mode, the CBM 8032 Color Computer provides 160 x 100-point resolution for creation of high-resolution displays.

The computer contains an enhanced 32k screen-edit ROM that provides the color-handling capability. The standard CBM Version 4.0 BASIC interpreter remains unchanged. The price of the CBM 8032 Color Computer is \$3495.

For more information about both computers, contact Commodore Business Machines Inc., Computer System Div., 681 Moore Rd., King of Prussia, PA 19406; (215) 337-7100. **CIRCLE 109**



# We solve problems.



---

## POWERFUL, NEW RECEIVABLE SYSTEM

---

We had a problem! We were able to generate an accounts receivable report using The Data Factory but we couldn't print invoices, statements, aging reports, or daily summaries on cash received. As our business increased, too much time was being spent on manually typing invoices and compiling past due accounts to produce statements. We also needed a breakdown showing how long an account was past due. In the past, all of our programs were submitted to us by authors. This time we established a team using the best of our staff and we devoted nine months to do the job right.

Our own office manager couldn't operate a computer. She was frightened at the thought. When she saw the time that this program saved her over the previous system, she became a believer. Now she is our best salesperson. She explains to callers that if she has learned to operate The Invoice Factory, anyone can. All you need is an \*Apple computer, two disk drives, a monitor and a printer.

\* Apple is a trademark of Apple Computers, Inc.  
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We solved our initial problem and then increased its power. We added automatic handling and COD charges, UPS zone and billing calculation, and product, price extension and sales tax computation. You can produce a sales analysis starting from any day of the year to produce a weekly, quarterly, semi-annual or annual (by fiscal year) report to calculate sales. Then print this analysis of the products with graphs. The 5¼" floppy disk version can handle up to 550 active accounts. The system will generate account receivable reports and do a 30-60-90 day aging. Credit memos can also be applied. The system handles overpayments and underpayments and gives you an audit trail for your daily receipts. You may include a message on every invoice. The system will even produce mailing labels for you. It does it all.

As usual, Micro Lab has provided the user with an easily understandable manual. Sample blank invoices and statements are included in the package to get you underway. You will probably be able to print invoices

and statements in the first afternoon.

The Invoice Factory will change. As we develop new ideas we will add them. As always we will read your suggestions and listen to your needs. From time to time a new version will be issued. Each package includes an original set of two disks along with two back-ups. If you blow a disk there is no delay in operations. You are never without a working program. Micro Lab's Extended Warranty for The Invoice Factory is \$50 annually. This will allow the policy holder free renewals on the program diskettes (on like media) in case of any damaged program disks, as well as updates when new features are added. The first years warranty is now included in the purchased price.

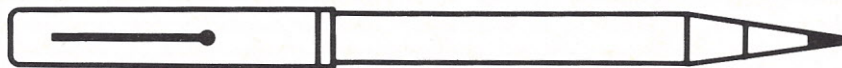
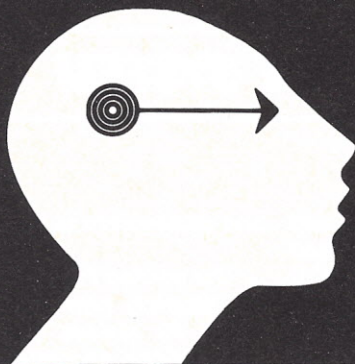
Micro Lab may also produce other products to work along with your Invoice Factory. The Invoice Factory is compatible with The Data Factory written by Bill Passauer. You may see it at your local \*Apple or Micro Lab dealer. The system retails for \$200, although some dealers offer other services so the prices may vary.



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## SYSTEMS

### Modular Microcomputer

A modular boardlevel microcomputer system, the AIM 65/40, for industrial and scientific applications has been introduced by the Electronic Devices Division of Rockwell International.

The AIM 65/40 professional microcomputer is made up of four modules, an R6502 based single board computer with on-board expansion to 65 kilobytes of memory, a printer with full graphic 280 X N dot matrix and 40-column alphanumeric modes, a 40-character alphanumeric display, and a full ASCII keyboard with user assignable function keys.

The Series 1000 single board computer module features system address expansion up to 131K, with 65K of on-board memory, up to 48K of RAM and up to 32K of ROM or EPROM. Six level priority interrupt logic and six 16-bit multi-mode timers are included for flexibility.

Extensive I/O capability provides an RS-232C asynchronous communications interface channel with programmable data rates of up to 19,200 baud for terminals or modems, plus a 20mA current loop TTY interface, dual audio cassette interfaces, two user-definable 8-bit parallel ports with handshake control, and an 8-bit serial shift register.

Three additional 8-bit parallel ports are directly programmable to provide more TTL level I/O for the user's application. In the AIM 65/40 these ports interface to keyboards, displays and printer modules. The printer connector is compatible with the Centronics parallel interface.

A buffered system bus accommodates off-board expansion using Rockwell's RM65 microcomputer modules, which include intelligent peripheral controllers for 5¼-inch

or 8-inch floppy disks, CRT monitors and the IEEE-488 instrumentation bus. RM 65 also offers additional serial and parallel communications interfaces and a selection of RAM, ROM and PROM memory expansion options up to 128K of memory expansion options.

The AIM 65/40 Model 0600 graphics printer module consists of an intelligent microprocessor controller integrated with the printer mechanism. This module operates in two modes; character mode operation which prints upper and lower-case ASCII characters, mathematical symbols, and a semigraphic character font formatted as 40-characters/line at 240 lines/minute, and a full matrix. With its own microprocessor controller, user-changeable character generator ROM, thermal head drivers, motor control, and parallel handshake ASCII interface, the peripheral minimizes demand on the central processor.

The Model 0400 display module features a vacuum fluorescent 40-character alphanumeric display. The module has its own microprocessor controller for display of alphanumeric, special, and limited graphic characters, parallel handshake ASCII interface and support circuitry. Special control commands permit variable display timing, cursor control, auto-scroll and character blinking.

The Model 0200 keyboard module provides a terminal style alphanumeric and special character keyboard matrix with 64 keys.

The AIM 65/40 Series 500 incorporates a ROM resident software system and integrates all four modules into a complete microcomputer system. The interactive monitor software controls the AIM 65/40 system with single keystroke, self-prompting commands, supports software development with assembler, debug and control commands. A multi-file text editor supports line

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### New Training Tool.

A newly conceived product that is now being released is "The Learning System." This program enables anyone to establish a training program that includes teaching information, instruction, and three types of testing. No longer must you spend weeks training a new employee when the current staff is promoted or leaves. Simply give the new employee this training device, and allow him to access previously entered information to teach himself.

### Consumer Oriented.

Micro Lab's products have been sold to thousands of corporations. It is a name that you can rely on. Our Extended Warranty and customer service policies are the standard in the small computer industry. When you decide to buy a Micro Lab product, you can be assured that our system will work. For a minimum investment in this inexpensive computer system, your entire office will function smoothly and efficiently. Large corporations need not tie up their main computer with specialized office procedures—you can place one computer in each department, or tie a branch office into your system with a modem. You can't afford to be without our products.

Each product described above retails for \$150. For further information about Micro Lab products, contact us directly or go to your local Apple computer dealer for a demonstration.

# micro lab

systems that work

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CIRCLE 60

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## THE LEAST EXPENSIVE PROGRAMS YOU CAN BUY.

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**NewBasic—expands disk basic**  
Now configure your Basic to do any or  
all of the following:

- Convert decimal to hex, and vice versa, provide character representation for each, or the hex-dec number of any character
- Blinking cursor
- Repeat key
- Audible key entry (each key makes a sound)
- directory command from Basic
- Disk load and disk run command file
- Graphic functions, including drawing blocks, lines, filling-in blocks
- Lowercase driver
- RS232 driver (LPRINT-LLIST)
- Call function, hex-order number will execute subroutine
- Spooler and despooler
- Print toggle, LPRINTS your video display
- Find (locate a Basic command or string)

Modular Software Assoc.; tape \$19.95, disk \$29.95

### Level II Tapes

'Tiny' Pascal runs on any 16K Level II system, includes the programming structuring capabilities of full Pascal, but not data structuring.

Able to compile Z-80 machine code, programs run about 5X faster than Level II Basic—graphics run eight times faster! Requires use of T-Bug (or Tape 7) and ETASM.

Tape 3, People's Pascal	\$19.95
Tape 1, 34 buis., edu., game progs.	\$10.95
Tape 2, 77 programs from Osborne book: Some Common Basic Programs	\$10.95
Tape 5, 24 buis., edu., game progs.	\$10.95
Tape 7, 31 buis., edu., game progs.	\$10.95
Tape 8, 40, inc. 4X tape speedup	\$10.95
Tape 9, 25 buis., edu., game progs.	\$10.95
Tape 10, income tax, check act	\$10.95
People's Taxman, fills-out all forms	\$39.95

### PASPATCH

**PasPatch, Tape 6P, makes Tandy tiny Pascal a powerful disk system!**  
Modular Software Assoc. \$19.95

### SuperPIMS—People's Database

PIMS has been greatly speeded up and simplified, with machine-language sorts, key debounce, optional automatic lowercase (no keying, no hardware mod) on labels or reports. Up to 20 fields, limited by 240-character maximum per record. Easy to revise, add records, split or merge files, sum or average any fields. Customized for tape, tape & disk, Zoom, TC8 Poor Man's Floppy, B17, Stringy Floppy—all on one tape! As mailing labels program, easily manages 20,000 list. CIE does! Advanced labels module to come, \$24.95, making system most powerful mailer available! \$25.90 on disk program (CIE) \$19.95 (\$21.15 CA) book, details uses (CIE) \$11.95 (\$12.67 CA)

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### Word Processing Newsletter

Want to really USE your computer? Then word processing is for you. Let your computer show you how much easier writing can be.

Learn about the new 510 cps 'non-daisy' that at 10X daisy speed gives correspondence quality, at less than twice the cost. Too slow? The really fast guys are coming. How about 30 11x14 typeset-quality documents per minute? Maybe you could use the same 'printer' as a copier.

How about an inexpensive (\$169) magnetic card reader-writer that would let you input mail addresses, letter paragraphs, even small programs?

Read about all this and more in Low Cost Word Processing, the only newsletter about word processing using your personal computer. Just \$15 for 12 issues.

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## HARDWARE UPDATE

and screen editing functions.

Price of the complete AIM 65/40 Model 5000 desktop microcomputer system is \$1795. In module form the Model 1000 single-board computer is \$1195; the Model 0600 graphics printer is \$375; the Model 0400 intelligent display module is \$340; and the Model 0200 keyboard is \$125.

For more information contact Rockwell International, Electronic Devices Division, 3310 Miraloma Ave., P.O. Box 3669, Anaheim, CA 92803; (714) 632-2321.

**CIRCLE 110**

## The Rhythm Box

The Rhythm Box synthesizes the sounds of seven different percussion instruments including bass drum, wood block, snare drum, short cymbals, long cymbals, hand-clap and tom-tom. A single OUT instruction generates any combination of percussion sounds plus a loudness control for rhythmic emphasis.

The Rhythm Box was designed for game players, computer-music enthusiasts, music teachers and professional musicians who want to create anything from a simple repetitive rhythmic pattern to a long continuously varying percussion score. It can be used alone or with other music peripherals, and a second unit can be added for stereo. The Rhythm Box comes with a phono jack for connection to your audio systems, a UL listed power supply, 60 day warranty, user manual, and rhythm charts.

Available with two interface options: Model RBX-T is priced at \$149 for the Model I Level II TRS-80; and the Model RBX-S, \$179, for use on all other computers.

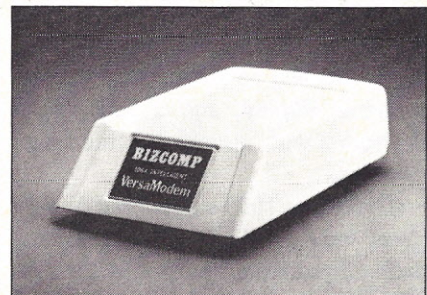
For further information contact Newtech Computer Systems, Inc., 230 Clinton St., Brooklyn, NY 11201; (212) 625-6220.

**CIRCLE 111**

## COMMUNICATION

### Versatile Modem

The Model 1084 Intelligent VersaModem, introduced by Bizcomp, is compatible with Apple, Radio Shack, Commodore, Atari and many other personal computers. On the network side, VersaModem is compatible with the Bell 103 protocol used by such information utilities as Micronet, The Source, Dow-Jones, Westlaw and time-sharing services and university computers.



The modem is registered with the Federal Communications Commission for direct connection, eliminating the monthly rental charge for a phone company DAA attachment. Applications include store-and-forward message routing, remote database access, off-hours automatic polling, computer/terminal networking, remote computer diagnostic and CPT-TWX network modes.

The VersaModem costs \$299. For more information: Inquiries Manager, Bizcomp Corp., P.O. Box 7498, Menlo Park, CA 94025; (415) 966-1545. **CIRCLE 112**

### Synthesized Voice

A second-generation serial line controller, the SLC-II, combines microprocessor intelligence with voice capability. Introduced by Digital Pathways, the new controller

*continued on page 109*



# HARDWARE UPDATE

continued from page 106

can automatically dial phone lines and "talk" in an electronically synthesized voice.

Its vocabulary includes more than 300 words, as well as the complete alphabet and all numerals. And the SLC-II will spell what it can't say.

The controller requires no software changes to the host computer's operating system. It connects between any computer and terminal to monitor the flow of messages. It can then be "taught" to initiate desired voice messages at specific time intervals.

The SLC-II can also "listen" and respond to incoming phone messages that originate at a remote terminal or that are generated by a telephone keypad.

Applications include data collection/transmission, telephone access to large data bases (like credit verification), alarm signaling and security/facility monitoring.

The unit provides ASCII input/output, Touchtone input, printer output and external amplifier output.

The SLC-II features automatic time and date entry with a day/month/year calendar in either American or European formats. It comes with built-in power backup (rechargeable batteries), an auto-dial/auto-answer modem, and 16, 32 or 80 kbytes of RAM. Connection to existing computer systems is simplified through the use of a standard RS-232 or 20-mA serial loop interface.

The price is \$1975. For more information: Digital Pathways Inc., 1260 L'Avenida, Mountain View, CA 94043; (415) 969-7600.

**CIRCLE 113**

## Direct Connect Modem

Microconnection, a direct connect modem for the TRS-80 Model III, can be used with all RS232-equipped

models from Level I, 4k, to Level II, 48k, disk systems.

The modem, from Microperipheral, is compatible with the Bell 103 protocol and operates at 300 baud in both originate and answer modes. An "intelligent" terminal program is available for both disk- and cassette-based systems, and it permits transfer of programs and data. A "dumb" terminal program is supplied with the modem.



The Microconnection measures 7.7 inches wide by 5.5 inches deep by 1.7 inches high and weighs less than a pound. The price, including power supply and terminal program, is \$199.50. The AUTODIAL/AUTO-ANSWER module is priced at \$79.95.

For additional information: Microperipheral Corp., 2643 151st Place N.E., Redmond, WA 98052; (206) 881-7544. **CIRCLE 114**

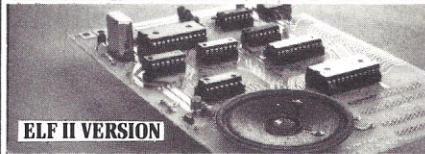
## PERIPHERALS

### Clock for TRS-80

TCHRON, by Web International, is a real-time clock for the TRS-80 that has its own power supply, allowing it to continue to run when the computer is off. TCHRON will provide instantaneous month/date/year, day of week, hour: minute: second and AM/PM information.

The clock is crystal-controlled with a calendar that compensates for leap years. Time-keeping can be by

# NEW!!! THE ELECTRIC MOUTH\*



**ELF II VERSION**

for S100, Elf II, Apple, TRS-80 Level II\*

From \$99.95 kit

**Now — teach your computer to talk, dramatically increasing the interaction between you and your machine.**

That's right: the ELECTRIC MOUTH actually lets your computer talk! Installed and on-line in just minutes, it's ready for spoken-language use in office, business, industrial and commercial applications, in games, special projects, R&D, education, security devices — there's no end to the ELECTRIC MOUTH's usefulness. Look at these features:

- ★ Supplied with 143 words/letters/phonemes/numbers, capable of producing hundreds of words and phrases.
- ★ Expandable on-board up to thousands of words and phrases (just add additional speech ROMs as they become available).
- ★ Four models, which plug directly into S100, Apple, Elf II and TRS-80 Level II computers.
- ★ Get it to talk by using either Basic or machine language (very easy to use, complete instructions with examples included).
- ★ Uses National Semiconductor's "Digitaler" system.
- ★ Includes on-board audio amplifier and speaker, with provisions for external speakers and amplifier.
- ★ Adds a new dimension and excitement to programming: lets you modify existing programs and games to add spoken announcements of results, warnings, etc.
- ★ Installs in just minutes.

**Principle of Operation:** The ELECTRIC MOUTH stores words in their digital equivalents in ROMs. When words, phrases, and phonemes are desired, they are simply called for by your program and then synthesized into speech. The ELECTRIC MOUTH system requires none of your valuable memory space except for a few addresses if used in memory mapped mode. In most cases, output ports (user selectable) are used.

Spoken Material Included									
one	eighteen	cancel	dollar	inches	at	number	ss	c	i
two	nineteen	case	down	is	of	second	d	u	v
three	twenty	cent	equal	it	off	set	e	v	
four	thirty	error	kilo	on	space	f	w		
five	forty	400hertz tone	feet	left	out	speed	g	x	y
six	fifty	80hertz tone	flow	less	over	start	i	z	
seven	sixty	20ms silence	fuel	lesser	parenthesis	start	j		
eight	seventy	40ms silence	gallon	limit	percent	stop	k		
nine	eighty	80ms silence	go	low	please	than	l		
ten	ninety	160ms silence	gram	lower	plus	the	m		
eleven	hundred	320ms silence	great	mark	point	time	n		
twelve	thousand	centi	greater	meter	pound	try	o		
thirteen	million	check	have	mile	pulses	up	p		
fourteen	zero	comma	high	milli	volt	weight	q		
fifteen	again	control	higher	minus	re	weight	r		
sixteen	ampere	danger	hour	minute	ready	a	s		
seventeen	and	degree	in	near	right	b			

\*"Elf II" and "The Electric Mouth" are reg. trademarks of Netronics R&D Ltd. "Apple" is a reg. trademark of Apple Computer Inc. "TRS-80 Level II" is a reg. trademark of Tandy Corp.

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- ☐ Apple "Electric Mouth" kit ..... \$119.95
- ☐ TRS-80 Level II "Electric Mouth" kit ..... \$119.95

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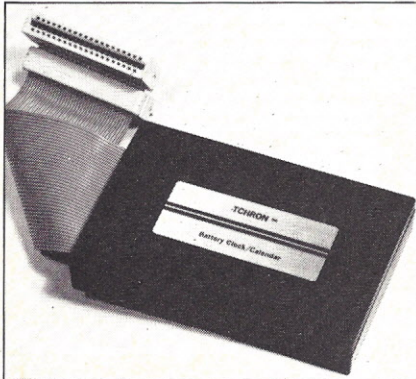
**CIRCLE 62**

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## HARDWARE UPDATE

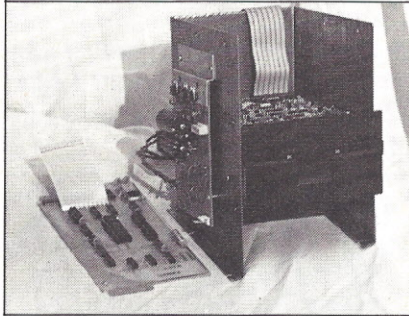
12-hour AM/PM or 24-hour military format. The clock has a simple SET ENABLE switch that need be set only once. The AAA batteries run in excess of 18 months. TCHRON plugs directly into the expansion bus or interface of the TRS-80.



The price is \$99.95. For more information: Web International, P.O. Box 96, Corona del Mar, CA 92625; (714) 494-2869. **CIRCLE 115**

### Storage Subsystem

The Disk III, offered by VR Data, is a 5¼-inch disk storage subsystem for the Radio Shack TRS-80 Model III computer. It is fully calibrated, aligned, tested and burned-in prior to shipping.



The basic unit consists of a controller, power supply, mounting bracket, one 40-track (6-ms) disk drive and associated cabling. Disk III options include a second internal 40-track drive, 80-track disk drives, two-sided 40-track drives or two-

sided 80-track drives.

The basic unit price is \$599. For more information: VR Data Corp., 777 Henderson Blvd., Folcroft, PA 19032; (215)461-5300.

**CIRCLE 116**

## INTERFACES

### Bus Expansion

As part of its AIM-Mate series of expansion products for the AIM 65, Forethought Products has released its STD-Mate interface to the STD bus.

By directly substituting for the STD bus processor card, STD-Mate allows full speed use of STD bus cards by the AIM 65 both for expansion of existing AIM 65 systems and development/debugging of stand alone STD bus systems.

## HOW TO GET THE SOFTWARE CATALOG WITH APPLE'S STAMP OF APPROVAL.

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**apple computer inc.**



**FIRST CLASS**



STD-Mate is available for \$140. For more information contact Forethought Products, 87070 Dukhobar Rd., Eugene, OR 97402; (503) 485-8575. **CIRCLE 117**

## I/O Board

North Star Computers announced a four-port serial input/output board called the HSIO-4. The board is S-100 bus compatible and supports asynchronous and synchronous communications with either RS-232-C or current-loop options.

Each port's baud rate is programmable with eight asynchronous or six synchronous speeds. Each port also has four interrupt sources.

The price of the HSIO-4 Board is \$349. For more information contact North Star Computers, 14440 Catalina St., San Leandro, CA 94577; (415) 357-8500. **CIRCLE 118**

parallel interface is the 8-bit character-serial bus system at up to 2000 characters/second.

All interfaces respond to ASCII input. A 36-character input buffer initiates automatic print at buffer overflow.

The Model 6430 produces fade-free records by electric writing, while the Model 6470 uses thermal printing. Both can print boldface characters. Sixty-four different characters (letters, numbers and symbols) are each produced in a 5 x 7-dot matrix.

The list price is \$399. For more information: United Systems Corp., 918 Woodley Rd., Dayton, OH 45403; (513) 254-6251. **CIRCLE 119**

## Display Terminal

The V-2000 Video Display Terminal, incorporating a 12-inch nonglare screen and detached key-

board, is available from Micro Five. Terminal functions include reverse video, flashing, underline and half-intensity.



The V-2000 also contains 12 control keys, a separate numeric key pad, printer interface, two pages of memory and 20 programmable functions. The terminal costs \$1500.

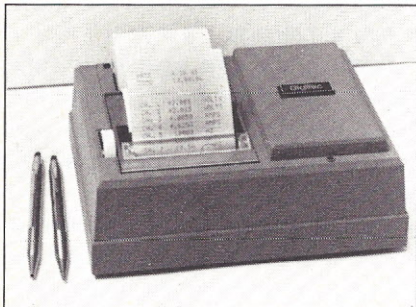
For more information: Micro Five Corp., 17791 Sky Park Circle, Irvine, CA 92714; (714) 957-1517.

**CIRCLE 120**

## INPUT/OUTPUT

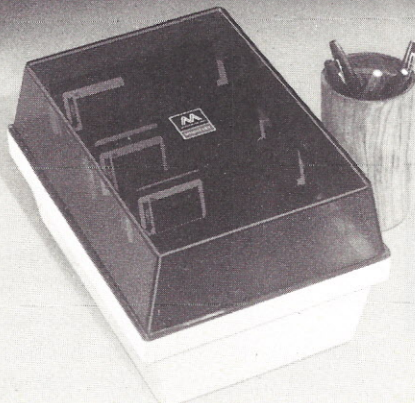
### Alphanumeric Printers

DigiTec Models 6430 and 6470, desk-top printers that print 21 or 32 columns of alphanumeric characters first line up, are offered by United Systems.



An internal microprocessor gives the printers enhanced operational and interface capabilities. Both models permit switch-selectable serial or parallel input. The serial input may be RS-232-C or an optically isolated 20-mA current loop at 110, 300, 600 or 1200 baud. The

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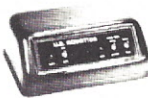
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# HARDWARE UPDATE

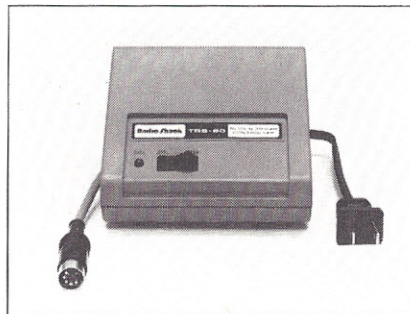
## BITS & PIECES

### Power Controller

The Radio Shack TRS-80 Plug 'n Power Controller permits direct computer control of up to 256 line-powered lights and appliances. It connects to the cassette output of any TRS-80 Model I, Model III or Color Computer.

Instructions are translated from the host TRS-80 computer into controlling signals, which are coupled through normal AC power wiring to Plug 'n Power remote appliance and lamp dimmer modules (sold separately).

The controller includes necessary software to make use of its capabilities plus programming advice. It comes equipped with an additional cassette connector and bypass switch to permit normal operation of the computer with a cassette recorder.



The TRS-80 Plug 'n Power Controller is U.L. approved and costs \$39.95. For more information: Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3272. **CIRCLE 121**

### Disk Mailers

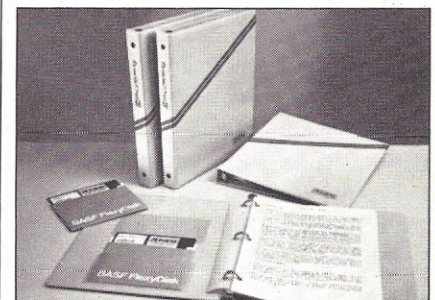
A new type of shipping container for protecting 8-inch and 5¼-inch flexible disks in the mail has been announced by Dennison KYBE. Designed to accommodate one or two disks, the containers are of rigid cardboard with a dust-free antistatic plastic liner.

The list price for 25 8-inch mailers is \$30. The 5¼-inch models are priced at \$15 for 25. For additional information: Dennison KYBE Corp., 82 Calvary St., Waltham, MA 02254; (800) 225-8715.

**CIRCLE 122**

### Vinyl Binders

Custom three-ring binders featuring two inside pockets for 5¼-inch diskettes are available from Percom Data.



The binders sell for \$4.95. For more information: Percom Data Co., 211 N. Kirby, Garland, TX 75042; (214) 272-3421 or call toll-free (800) 527-1592. **CIRCLE 123**

### Paddles and Joystick

A Super Paddle made by Peripherals Plus for Apple computers consists of a high-precision linear potentiometer and a big (½-inch d) industrial pushbutton mounted in a 4 x 2 x 1-inch metal case.

Each of the two paddles is connected with a five-foot cable to the Apple paddle socket. A set of two Super Paddles costs \$39.95 plus \$2 postage and handling.

Also available from Peripherals Plus is a Super Joystick, which uses the same resistive circuit used in the Super Paddles. The circuit provides linear control within 1/10 of 1 percent. The Super Joystick costs \$59.95 plus \$2 postage and handling.

For more information: Peripherals Plus, 39 E. Hanover Ave., Morris Plains, NJ 07950; (201) 540-0445.

**CIRCLE 124**



## SOFTWARE UPDATE

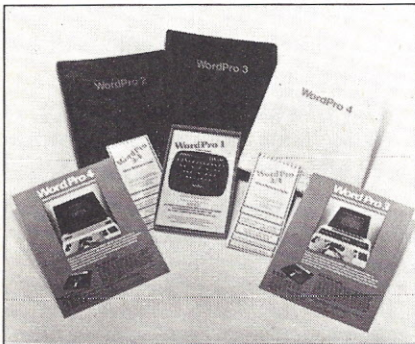
### BUSINESS

#### Word-Processing

WordPro 3 Plus and WordPro 4 Plus word-processing software is for use with Commodore computers.

Made by Professional Software Inc., its features include: math functions (adding and subtracting columns of numbers within text), superscripts and subscripts, bold overstrike, exit to BASIC, variable lines per inch, pitch settings, audible feedback, pause command and simultaneous Input/Output.

WordPro Plus programs provide for multi-user word processing. When used with the Multi-Cluster, WordPro 3 Plus and 4 Plus allow the use of up to eight CPUs with one disk drive, thereby creating a real-time multi-user word-processing system.



WordPro 3 Plus sells for \$295 and WordPro 4 Plus for \$450. For more information: Professional Software Inc., 166 Crescent Rd., Needham, MA 02194; (617) 444-5224.

**CIRCLE 125**

#### Medical Billing

The SoftCare medical billing system for the Apple II prepares patient bills and insurance claims, including Medicare and MediCal, for single or multiple doctor offices. Accounts receivable are maintained by patient and insurance carrier, and transaction detail is retained to per-

mit tracking of individual claims. The system even accounts for partial payment of claims, write-offs and secondary insurance carriers.

SoftCare guides the operator and does error checking as information is entered.

Patient files are updated with each entry, so bills and claims can be prepared upon demand.



Written in UCSD Pascal, the system runs on the Apple II with 8-inch diskette drives or the Corvus hard disk. The retail price is \$1995, and demonstration diskettes with an operator manual are available for \$60.

For more information: Professional Business Software, 119 Fremont St., San Francisco, CA 94105; (415) 546-1596. **CIRCLE 126**

### GAMES

#### Games for Atari

Three new games for the Atari 800—Invasion Orion, The Datestones of Ryn and Rescue at Rigel—are available from Automated Simulations.

Invasion Orion is a space battle game in which the player controls up to nine spaceships armed with destructor and tractor beams, missiles and torpedoes. Each ship spends energy on moving, shielding itself and firing its weapons. The player must decide how to allocate that energy to defeat his opponent.

The Datestones of Ryn challenges the player to recover the stolen

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**CIRCLE 67**

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# SOFTWARE UPDATE

Datestones of the ducal calendar of Ryn from within a maze. The adventurer battles robbers, monsters and twenty minutes are allowed to get in and get out. The computer draws a map of the dungeon and keeps track of the Datestones and other treasures found.

Rescue at Rigel, a science-fiction role-playing game, gives the player 60 minutes to find and rescue 10 humans held captive somewhere inside an alien moon base. The more prisoners the player gets to the rescue ship, the better his score. The player is equipped with shield, medikit, blaster and power gun.

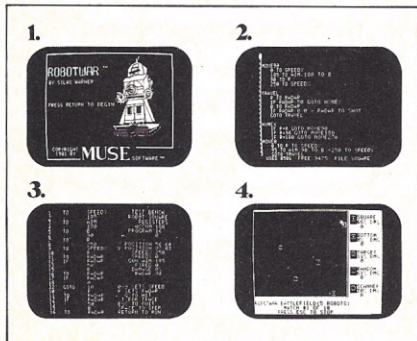
All three games allow either keyboard or joystick input. They are also available for Apple, TRS-80 and Pet microcomputers.

Invasion Orion (\$24.95), The Datestones of Ryn (\$19.95) and Rescue at Rigel (\$29.95) are available on cassette for the Atari 800 with 32k RAM. For more information: Automated Simulations Inc., P.O. Box 4247, Mountain View, CA 94040; (415) 964-8021. **CIRCLE 127**

## Literacy Game

RobotWar, incorporating the logic of systematic computer programming, is offered by Muse Software.

The player writes a special Battle Language program that gives the robot its individual personality. On the Robot Test Bench, the player has a cybernetic window into the robot's mind to check that the program is performing as planned.



RobotWar, at \$39.95, requires an Apple II or II Plus computer with 48k Apple-soft ROM and disk drive running 3.2 or 3.3 DOS.

For more information: Muse Software, 330 North Charles St., Baltimore, MD 21201; (301) 659-7212.

**CIRCLE 128**

## EDUCATIONAL

### Computer Literacy

Computer Discovery, an interactive course program in computer literacy is designed principally for junior and senior high school students. The program, by Science Research Associates, involves the student with both programming concepts and social issues related to computers.

Two 5 1/4-inch diskettes are supplied for the Atari 800, Apple II and Apple II Plus with Applesoft. Using a teacher-directed approach, including group instruction to each chapter, Computer Discovery can be completed in approximately six weeks of normal presentation.

The program can also be used individually on a student-directed basis and can be completed in as little as 15 hours, the company says.

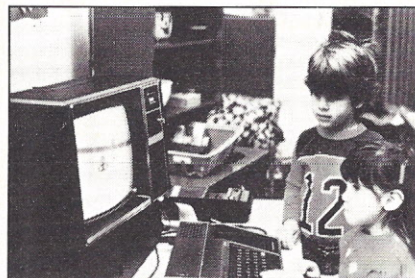
In addition to the program, student and instructor workbooks are available. The program is priced at \$185. For more information: Science Research Associates Inc., 155 North Wacker Dr., Chicago, IL 60606; (312) 984-2053. **CIRCLE 129**

### Computers in Education

TI LOGO, a fun-to-use computer language for pupils in primary school through high school, helps build problem-solving skills. Developed by Texas Instruments, the language is for use on the TI-99/4 personal computer.

Its development was the result of

cooperation between the company and the Massachusetts Institute of Technology. TI LOGO is structured so that even young children can successfully use the computer with little formal instruction. They use the TI-99/4's typewriter-like keyboard to draw geometric figures and designs and to create multicolored shapes on the display screen. They can move the shapes in selected directions at selected speeds.



A complete TI LOGO setup requires TI LOGO software, as well as a standard TI-99/4 personal computer equipped with a monitor (or TV set with RF modulator), disk drive, disk controller and memory expansion unit.

The suggested retail price is \$299.95. For additional information: Customer Relations Dept., Texas Instruments Inc., P.O. Box 53, Lubbock, TX 79408.

**CIRCLE 130**

## UTILITY

### Communications

Radio Shack's two communications software packages for the TRS-80 Model II computer allow it to operate with two types of IBM terminal equipment used for on-line communications or for batch-processing.

The packages allow the Model II to implement binary synchronous communications in full conformance to IBM standards. They include necessary software to implement the communication protocols





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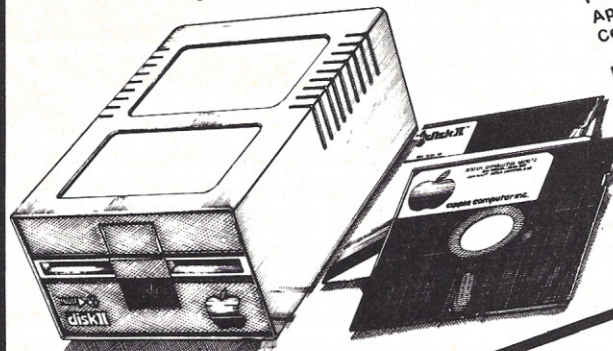
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**References:**

We have been an Apple dealer since 1978. Our bank reference is First Interstate Bank (503) 776-5620. We belong to the Chamber of Commerce (503) 772-6293.

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## OPERATING SYSTEMS

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# SOFTWARE UPDATE

and code conversions, and a hardware conversion which modifies the computer's serial port to meet the requirements of the standards.

The on-line standard Binary Synchronous Communications 3270 program lets the Model II communicate with IBM Systems 360/370 and 30-series central processing units, or any non-IBM devices equipped with remote BSC-3270 communications capabilities. Functions include screen formatting, polling responses, data link control, timeout control and cyclic redundancy check. This package costs \$995.

The batch standard Binary Synchronous Communications 3780 program permits a TRS-80 Model II to function as an IBM-compatible Remote Job Entry (RJE) terminal. It allows user selection of IBM 2770, 2780, 3780 or 3741 terminal protocols, for communications with IBM 360/370 or 30-series host systems, with DEC PDP-11 and VAX-11 host systems, or with other devices equipped for binary synchronous communications capability. This program costs \$995.

Both programs require a TRS-80 Model II computer with 64k of memory. Synchronous communications through the computer's A serial port operate at a 9600 baud data rate, or at data rates up to 19,200 baud. Both will operate with half-duplex or full-duplex communication facilities.

For more information: Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3272.

**CIRCLE 131**

## Color Assembler

A Color Assembler for Radio Shack's Color Computer has been introduced by Computerware. The assembler is a 6809 machine code assembler that supports all 6809 mnemonics and addressing modes, along with standard assembler

options and directives. It operates as a two-pass assembler, so both forward and backward references are allowed.

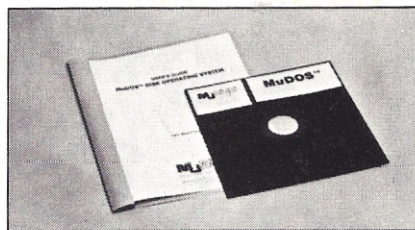
To assist the user of the assembler, the company includes a manual and the Motorola Instruction Set Reference Card. Documentation on many of the major subroutines in the Color Computer's BASIC and the Power Pack's Monitor are also included. The Color Assembler, priced at \$29.95, requires the Power Pack to be installed.

For more information: Computerware, Box 668, 1512 Encinitas Blvd., Encinitas, CA 92024; (714) 437-3512. **CIRCLE 132**

# SYSTEM

## Multi-user Software

MuDOS, a CP/M-compatible operating system, offers high throughput, reliability and features for both single and multi-user environments. Made by the MuSYS Corp., the system can be used with the MuSYS Net/80 and EXP/80 network slave processors. It can be customized to any Z80-based hardware configuration and used in place of CP/M, MP/M and CP/Net.



Standard features include a buffer manager that reduces the need for disk access; a reentrant file manager that allows simultaneous access on different controllers, if the controller hardware supports DMA transfers; and optional multiple-print queuing capability, which allows use of forms, types, fonts, and hand-fed single-sheet printing.

Utility software includes DIR,



COPY, RENAME, DELETE, LABEL, DRIVE, DUMP, TYPE, ASSIGN and SPOOLER.

MuDOS sells for \$300 to \$750, depending on configuration. For more information: MuSYS Corp., 1451 E. Irvine Blvd., Suite 11, Tustin, CA 92680; (714) 730-5692.

**CIRCLE 133**

## Recover Files

The UNERA program from Elliam Associates can recover one or more ERAsed programs. Just enter "UNERA [filename]" and the program will recatalog the [filename] back on the disk directory. The program can also work its way through a disk directory and display each ERAsed file name, allowing the user to recatalog the file, if desired, and list the program action on the printer.

UNERA works on both multidisk

and single-disk systems that use a standard CP/M directory. The program comes on a Scotch diskette in either 8-inch standard CP/M format or 5 1/4-inch for North Star CP/M users.

The price is \$35 plus \$1.50 for shipping and handling. For more information: Elliam Associates, 24000 Bessemer St., Woodland Hills, CA 91367. **CIRCLE 134**

## Multi-User Capabilities

MULTI/os, a multi-user operating system, gives the 8080/Z80 system user multi-user capability without need for user patching or configuration.

Released by InfoSoft Systems, the operating system supports floppy and hard disks with a shared data base of up to 975 million bytes of on-line data. Each logical unit can be as large as 65 Mbytes, and the system

will support multiple disk controllers without custom programming.

MULTI/os has an expanded directory capability that allows a virtually unlimited number of files. It is an interactively generated system, tailored for each hardware configuration on which it is used. The system can be used with memory banking or with extended addressing, and each user can have as much as 56 kbytes of user memory. MULTI/os can be set up in a turn-key mode and can provide an extended print spooler with multiple printer capability. A common data base manager is available to prevent two users from attempting to update the same data at the same time.

The price is \$1000, installed and ready to run. For more information: InfoSoft Systems Inc., 25 Sylvan Rd. S., Westport, CT 06880; (203) 226-8937. **CIRCLE 135**

(advertisement)

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**August 5-7—AUTOMATED OFFICE IMPLEMENTATION;** Biltmore Hotel, New York, NY; Dept. PR, NIMR Seminars, P.O. Box 3727, Santa Monica, CA 90403; (213) 450-0500.

**August 12-15—NEW YORK COMPUTER EXPO;** Albert Hall in the Sheraton Centre, New York, NY; NYCE, 110 Charlotte Place, Englewood Cliffs, NJ 07623; (201) 569-8542.

**August 11-13—BASIC: A COMPUTER LANGUAGE FOR MANAGERS;** AMA Management Center, Chicago, IL; American Management Assoc., 135 West 50th St., New York, NY 10020; (212) 586-8100, ex. 514.

**August 22—APPLE FAIR;** New York University, Tisch Hall, Washington Square Campus, New York, NY; Big Apple User's Group, P.O. Box 490, Bowling Green Station, New York, NY 10274; (914) 245-2734.

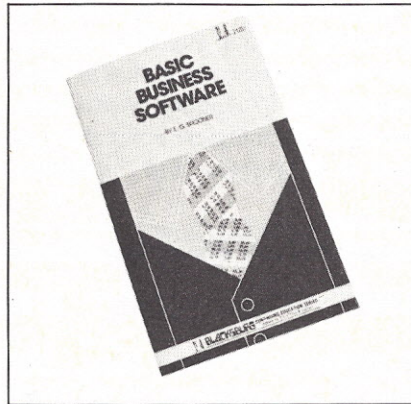
**August 25-27—BASIC: A COMPUTER LANGUAGE FOR MANAGERS;** AMA Headquarters, New York, NY; American Management Assoc., 135 West 50th St., New York, NY 10020; (212) 586-8100, ex. 514.

**August 26-29—NATIONAL SMALL COMPUTER SHOW;** New York Coliseum, New York, NY; National Small Computer Show, 110 Charlotte Place, Englewood Cliffs, NJ 07632; (201) 569-8542.

## Business Software

*Basic Business Software*, a 144-page book by Ernest G. Brooner, helps business people understand some of the fundamentals of business software development. It introduces the reader to the methods by which software is written, so he can write his own program or evaluate those programs available from others.

Several useful programs have been provided to enable the small-business operator to start using a small computer system immediately and evaluate its potential for saving time and effort.



Throughout the author stresses the uses of the three major subclasses of business programs: information storage and retrieval, information processing, and information input and output. The discussion proceeds to software functions, computer languages, available software and how to customize it, hardware compatibility and costs. Programming symbols and terms are defined, and the steps in developing a working program are covered.

Complete listings are provided for nine business programs, along with flow charts and documentation. Although they are written in North Star BASIC, the programs should be readily translated into other BASIC languages. Several programs are provided in Microsoft BASIC.

The book is priced at \$9.95. For more information: Group Tech-

nology Ltd., P.O. Box 87, Check, VA 24072; (703) 651-3153.

**CIRCLE 136**

## Automated Office

*The Automated Office: An Introduction to the Technology*, by Dr. William Saffady of the Pratt Institute, covers the creation, storage, manipulation, retrieval, reproduction and dissemination of information. Dr. Saffady notes that the people involved include managers and administrators, professional and technical personnel, the sales staff and clerical workers.

Chapters describe the building blocks of office automation, including word processing, computers, micrographics, reprographics and electronic communications. The communications touch on electronic mail and message systems, facsimile, TWX and telex, image transmission and video. A glossary is included.

The book costs \$29.50. For more information: National Micrographics Association, Publications Sales, 8719 Colesville Rd., Silver Spring, MD 10910; (301) 587-8202.

**CIRCLE 137**

## Using the TRS-80

Kenniston W. Lord Jr. brings the microcomputer down to the layman's level of understanding in *Using the Radio Shack TRS-80 in Your Home*. This book delves into the "why" of using the computer in the home and leads the reader step-by-step through the language and application of the microcomputer.

The text takes complex computer operations and presents them in logical sequences, teaching the reader how to adapt various methods to particular needs. It shows how applications can assist in finances, marketing, planning, automobile maintenance, recrea-



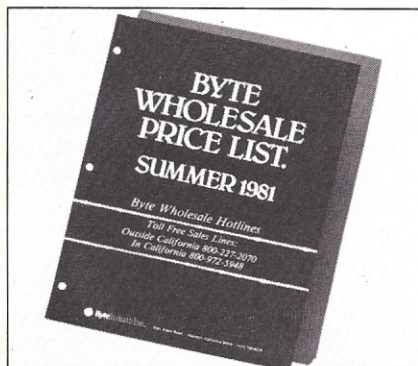
tional planning and educational needs. There are also sections on the construction of computer games.

The book is priced at \$21.95. For more information: Van Nostrand Reinhold, 135 W. 50th St., New York, NY 10020; (212) 265-8700.

**CIRCLE 138**

## Summer Catalog

Byte Industries' Wholesale Price List offers six new product lines to computer retailers, large end users, office machine dealers, systems houses and OEMs. The catalog includes over 1000 products from 52 manufacturers. In addition it lists product closeouts and special deals at significantly reduced prices.



Added product lines include: ABT Apple peripherals, including the Apple Ten Key Pad and the Apple Bar Core Wand; Surge Sentry products; Microtek memory expansion boards for the Atari 400/800 computer; Hitachi monitors; Lexicon modems; and C. Itoh printers. Others product lines include Texas Instruments, NEC, Dynabyte, Hazeltine, Hewlett Packard, Qume, 3M, Centronics, and Diablo.

For more information: Byte Industries, 3501 Arden Rd., Hayward, CA 94545; (415) 783-8272.

**CIRCLE 139**

## Apple Programs

Practical applications, educational uses, games and graphics are

covered in *32 BASIC Programs for the Apple Computer*, by Tom Rugg and Phil Feldman.

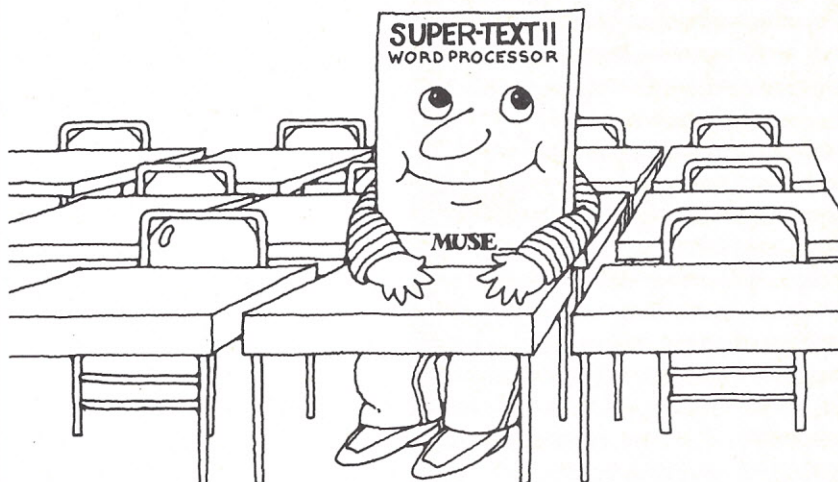
Each chapter contains eight sections that explain the following about the programs: purpose, how to use it, sample run, program

listing, easy changes, main routines and main variables. The 280-page book sells for \$17.95.

For more information: dilithium Press, 11000 SW 11th St., Suite E, Beaverton, OR 97005; (503) 646-2713. **CIRCLE 140**



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**CIRCLE 107**

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## Video Display Terminals

*continued from page 49*

The Vector Graphics Mindless Terminal is one.

This VDT uses a remote terminal consisting of only the keyboard and the CRT in a cabinet. The video display board for the unit is memory-mapped and plugs into the S-100 bus. It is connected to the remote unit by a cable. This enables the user to run the Memorite word processing software, which requires memory-mapped video.

The Micro Da Sys Millie, some of the OSI Challenger computers and the GIMIX 6800 computer are all sold with plug-in video display units and remote keyboards and CRTs. These units can also use a serial I/O board and a VDT, if desired.

As for software, there are many of the usual "gotchas" for video display and graphics boards. First, you will need software drivers to use video display boards on your bus. These driver programs must be compatible with your operating system and the high-level language you are using. Before you buy this equipment, be sure that you can use it with the operating system you have and that the driver programs come with the board.

Finally, if you are an Apple II owner and you want to add an 80-column video board, be sure that it is compatible with any word processing or graphics software that you own or intend to buy. Not all of these boards work with word processing systems. Check for compatibility with any keyboard modifications you might have made.


### Used VDTs: beware

You've evaluated all the equipment and are ready to buy. Should you buy a used VDT?

Unless it is so cheap that you can throw it away when it breaks down, don't buy a used terminal. It will be hard to get service on it unless it is a

recent model. Today's technology is changing rapidly, and old units are being phased out.

Most of the VDTs offered used cost a good deal when they were new; so their used price is apt to be

high, too, by today's standards. You're better off buying a less expensive new unit with a warranty. If the CRT dies on a used VDT, you will find that a replacement is very expensive and hard to find. 

## VDT GLOSSARY

**Baud**—Bits per second. The speed of computer data transmission.

**Character set**—The type of characters that the VDT will show on the CRT.

**CRT**—Cathode-ray tube. The electron tube that projects the character data or graphics on its flat face.

**Cursor**—A place mark, such as a white rectangle, that shows the place on the CRT where the character will be printed.

**QWERTY keyboard**—The alphabetic arrangement of all VDTs is the same as that on a standard typewriter. QWERTY are the first six keys on the top row of letters.

**Scrolling**—Moving the text on a CRT screen up, down or from side to side.

**Modem**—Modulator/demodulator. A device that converts computer data signals to varying tones and transmits them over a telephone line. It also receives such tones from a remote source and converts them into digital data signals for input into a computer.

**Numerical keypad**—An additional set of numbered keys on a keyboard.

**Serial data**—A method of transmitting digital information by a series of electrical pulses sent one after another.

**Terminal**—A device used with a computer to both receive and transmit information. It may print the information or show it on a screen.

**Teletype**—A combination printer, paper-tape punch and reader used as a terminal. The word Teletype is a trademark. The generic word is teletypewriter.

**Timesharing**—The use of a computer by many users at the same time.

**Video display**—Text or graphics shown on a screen like a TV picture.

**Video Display Terminal**—An electronic device used to send and receive digital information to and from a computer. It consists of an alphanumeric keyboard similar to that on a typewriter, a picture tube (CRT) and electronic circuits to communicate with a computer. When a key is pressed, the VDT keyboard sends a digital code to the computer. When the computer sends a code signal to the VDT, it interprets it and "paints" the character on the CRT.



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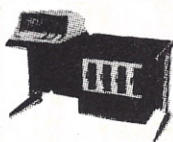


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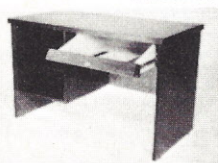
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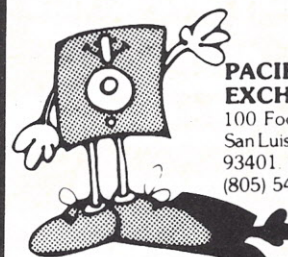
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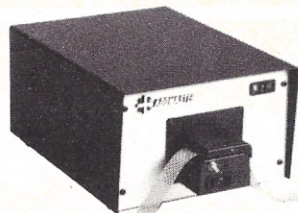
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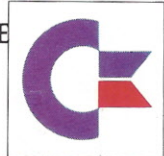
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